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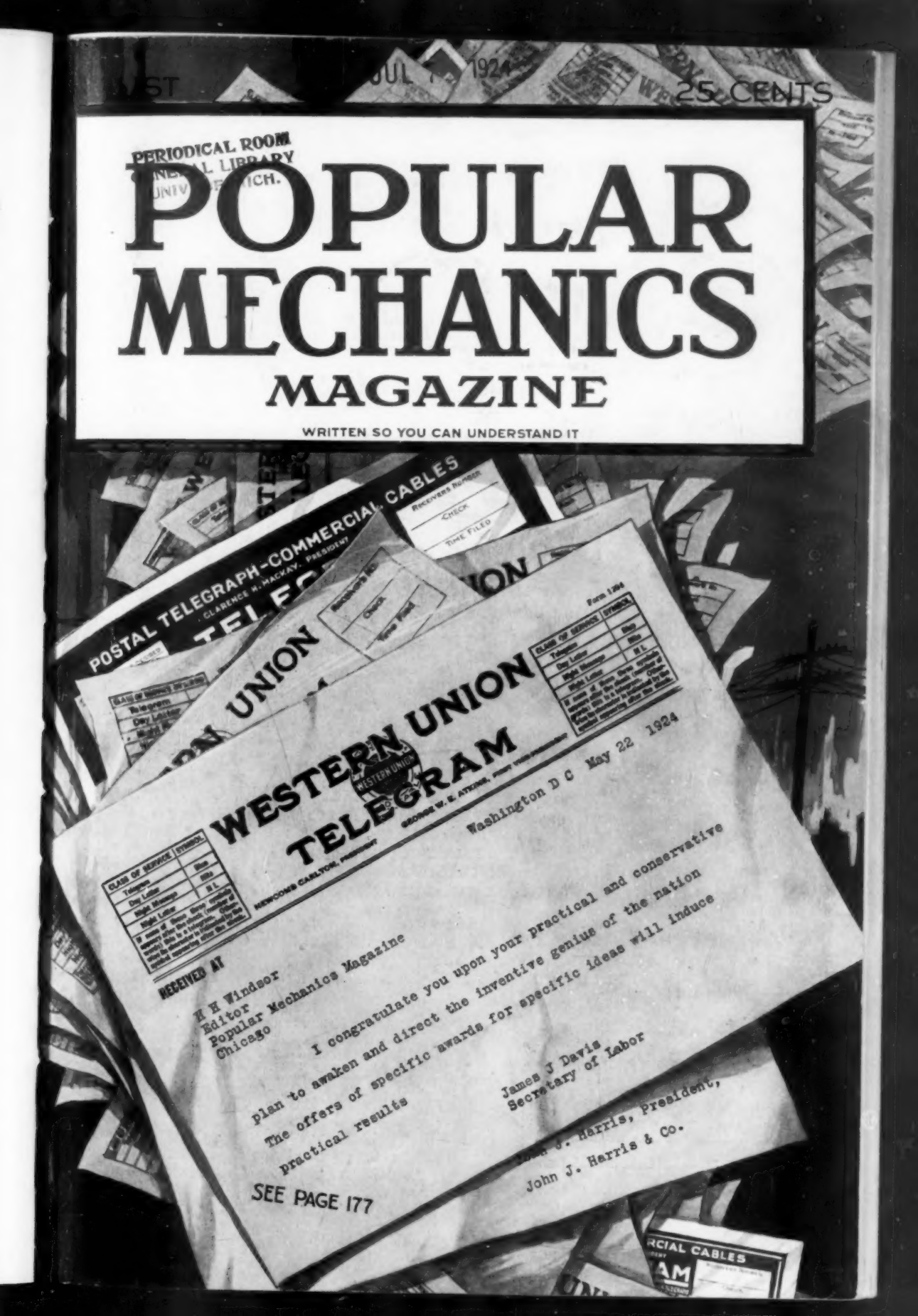
POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT


POSTAL TELEGRAPH-COMMERCIAL CABLES
CLARENCE H. MACKAY, PRESIDENT
WESTERN UNION
TELEGRAM
NEWCOMB CARLTON, PRESIDENT
GEORGE W. E. ATKINS, VICE PRESIDENT
Washington D C May 22 1924
RECEIVED AT
H H Windsor
Editor
Popular Mechanics Magazine
Chicago
I congratulate you upon your practical and conservative
plan to awaken and direct the inventive genius of the nation
The offers of specific awards for specific ideas will induce
practical results
James J Davis
Secretary of Labor
John J. Harris & Co.
SEE PAGE 177

Big Demand for Auto & Electrical EXPERTS

Electrical Expert

Tractor Expert

Automotive and electrical fields growing by leaps and bounds. A hundred thousand more expert mechanics needed now. I can fit you in fifty days to fill a big job. McSweeny trained men earn from $50 to $250 per week. Read on for proof of this—

$800 Month

DEAR MAC:

Before going to your school I was working on a farm for fifty dollars a month and did not have steady work nor a bright future. Now, as a result of your training, I have my own garage and sales agency and average $800 per month. I owe it all to your training.

(signed) GEORGE SMITH,
West Alexandria, Ohio.

And Fred Pendley, Blowing Rock, N. C., writes: "McSweeny training made me Chief Mechanic of a big plant in three months." These two are typical of many we could quote to prove that McSweeny training paves the way to better jobs and bigger pay.

Auto Salesman or Demonstrator

NOW Two Big Schools to train You for a Big Job!

I now control the former Rahe School of Cincinnati, Ohio, and the former Cleveland Auto School of Cleveland, Ohio. Chances are you can reach one of them by a day's trip. Two fine schools advantageously located—nearest the masses of population, the most autos and most jobs.

Guarantee

To whom it may concern:

I, J. B. Dudley, will state under oath that I am now attending the McSweeny School and find everything as represented. In fact, better than expected. The course of instruction is practical and the McSweeny method of learning by actually working with real tools on real jobs under experienced instructors enables a fellow to learn a powerful lot in a few days.

(signed) J. B. DUDLEY,
McSweeny School Student.

What more could you ask than this guarantee of satisfaction — sworn testimony of a student!

Garage Owner or Manager

Railroad Fare Paid
Board 8 Weeks FREE

Lack of space prevents full details. Write for complete information about my special tuition offer with railroad fare paid and board for eight weeks free.

McSweeny Auto, Tractor & Electrical Schools
Dept. 147 (*Address School Nearest You*)

Send me your Big Free Book on auto and tractor business, and send me information on special reduced tuition offer with railroad fare and board paid, now in effect for short time.

Name.....

Street or R. R.....

City or Town..... State.....

NO FACILITIES FOR COLORED STUDENTS

McSWEENY
Auto, Tractor & Electrical

Operating former Rahe School of Cincinnati and Cleveland School, Cleveland, Ohio

9th & Walnut Cincinnati, O. Schools 1815 E. 24th Cleveland, O.

Big Money Business

Have Success Like This

Here is H. A. Bradley—merely one of thousands of Michigan State students who have achieved success far beyond their fondest hopes. What these men have done you can do. The opportunities are now greater than ever. There are more autos—more trucks—more tractors and every year adds to the money-making possibilities. You have ambition—you want success. Success is certain if you are willing to work for it. You can have independence—be your own boss—stop the plodding and get into work you like. You can earn big money, be prosperous, happy and independent. Bradley is no exception, we have graduates who have made as high as $10,000 in less than a year. These records may seem amazing, but they are true. It is all done through head and hand training at the Michigan State. Decide now to give yourself the training that will pay you big and establish you in a successful life work.

Spend Your Summer at Detroit

"The Summer Resort" City

Where business is always good. Where weather is always fine. Detroit's location in center of the Great Lakes gives it ideal climate, not too cold in winter, not too hot in summer. Get away from the burning sun into the cool breezes of Michigan. After school hours, enjoy boat trips, swimming, fishing, sailing, canoeing on the lakes and river. See Major League baseball games—see Ty Cobb, Babe Ruth, Eddie Collins, Tris Speaker, Walter Johnson, George Sisler—all the stars. Spend a pleasant summer and **improve yourself at the same time.** We work hard up here but we believe in some good times too.

Detroit-Trained Auto Men Earn More Money

Detroit-trained men are preferred. Your diploma from the Michigan State is a valuable money-making asset—an advantage that you can get from no other school. The Michigan State Automobile School is known the world over. Wherever autos are used—Detroit-trained men get the best jobs, highest pay. Auto, truck, tractor factories employ M. S. A. S. graduates. Leading factories, dealers, service stations, garages, shops and farms want men who have trained their heads as well as their hands—the M. S. A. S. Detroit-kind.

Good Positions Open

The demand for men who know automotive mechanics and electrics is greater than the supply. We have more calls than we can fill. The **training in Business Management and Salesmanship** included in our courses makes our graduates especially valuable. The years ahead are predicted to be the biggest years of the industry. That means certain money-making advantages to men who start in the business now.

Mail This Coupon

Get all the interesting facts from our big catalog. It's a book of information concerning **your future** that you must not fail to get. It gives complete information about all courses. It's illustrated with photos of school, equipment and graduates. It tells you how you can get a good paying job—how you can go into business for yourself with little capital. Let us send it to you FREE without obligation. Mail the coupon or send us a postcard today. Write now. (We do not enroll colored students, except for our Home Study Course.)

AUTOMOBILE SCHOOL

3729 Woodward Avenue, Detroit, Mich.

From $12.00 a Week to $500.00 a Month

Read Bradley's letter below. It's his own story of the credit he gives to M. S. A. S. for his success. The success you can enjoy, too, if you accept this opportunity.

H. A. BRADLEY

BRADLEY GARAGE
CLEVELAND, OHIO
Distributor Vesta Storage Batteries
ALEMITE LUBRICATOR SERVICE
Automobile Repairing

Michigan State Auto School, Detroit, Mich.

Gentlemen: I wish to state that before going to your School I was employed as shipping clerk with a well-known concern at the enormous salary of $12 per week. Incidentally, this included overtime. I knew absolutely nothing about an automobile. I couldn't even drive one and didn't know the difference between a carburetor and a wheel-base; in fact, I didn't know they had a wheel-base.

After leaving the School I worked as service repairman for the Oakland Motor Company of Pontiac, Michigan. I left the Oakland to accept a position as night service foreman for the Studebaker Company at Detroit and was later connected with such firms as the Northway Motor and Manufacturing Company, and the Continental Motor Manufacturing Company. I have since been service-manager for two large concerns—one in Detroit and one in Cleveland. The salary mounted all the time—the last position paying me $300 per month.

I, then, decided to go in business for myself, which business I have successfully built and maintained up to the present time and expect to maintain for a long time to come. I estimate the present earnings of my business at $500 per month clear and growing all the time.

I believe that the M. S. A. S. is by far the best School of its kind in the country. For the man who will apply himself to the work and to the studies I can safely say that the Michigan State Auto School is the best place to learn the automobile business.

Yours very truly,
H. A. BRADLEY.

Mail Coupon To Day

Michigan State Automobile School 308 Auto Building DETROIT, MICHIGAN

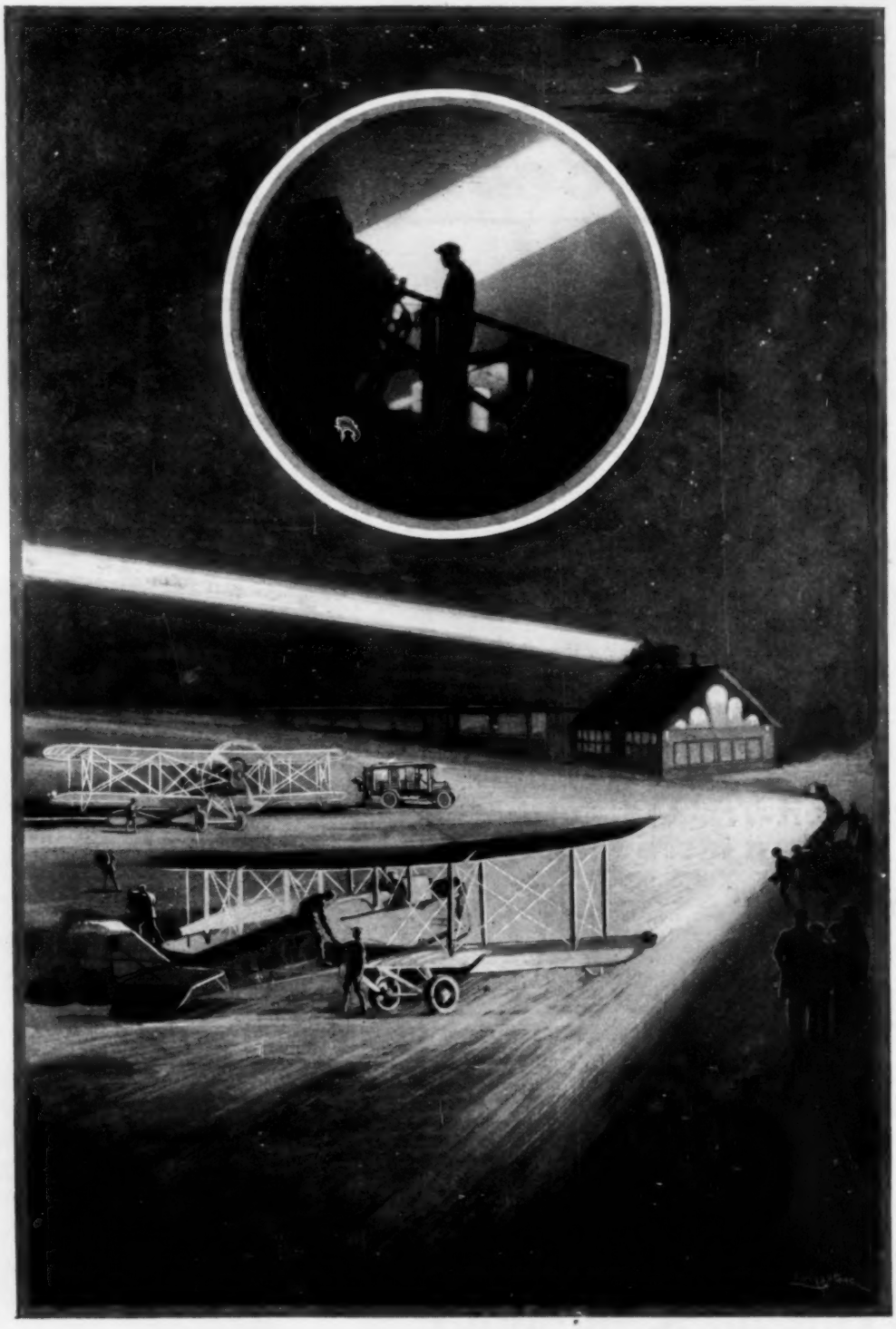
Send me FREE and without obligation your illustrated catalog and complete information about Detroit training to make the most money.

Name .....

Street or R. F. D. .....

City ..... State .....

Do you prefer to start your training at home or at our School in Detroit? .....



Landing of the Night Air Mail Amid Beams of Powerful Lamps That Make Daylight of Darkness; Insert, Closeup of 460,000,000-Candlepower Beacon—See Page 267

Popular Mechanics Magazine

REGISTERED IN U. S. PATENT OFFICE

WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 42 AUGUST, 1924 No. 2

More Than $128,400 Offered for Your Ideas

New Awards Widen Field and Afford Greater Opportunity for All in Seeking Solutions of Problems

Copyright, 1924, by H. H. Windsor

WITH new offers for ideas bringing the total to more than $128,400, words of praise for the Industrial Award Plan originated by Popular Mechanics Magazine continued to be received from all parts of the nation.

Heads of great educational institutions, high government officials and industrial leaders everywhere united in approval of the effort to awaken the inventive genius of the country and to bring about a new era of closer co-operation. A few of the letters read in part as follows:

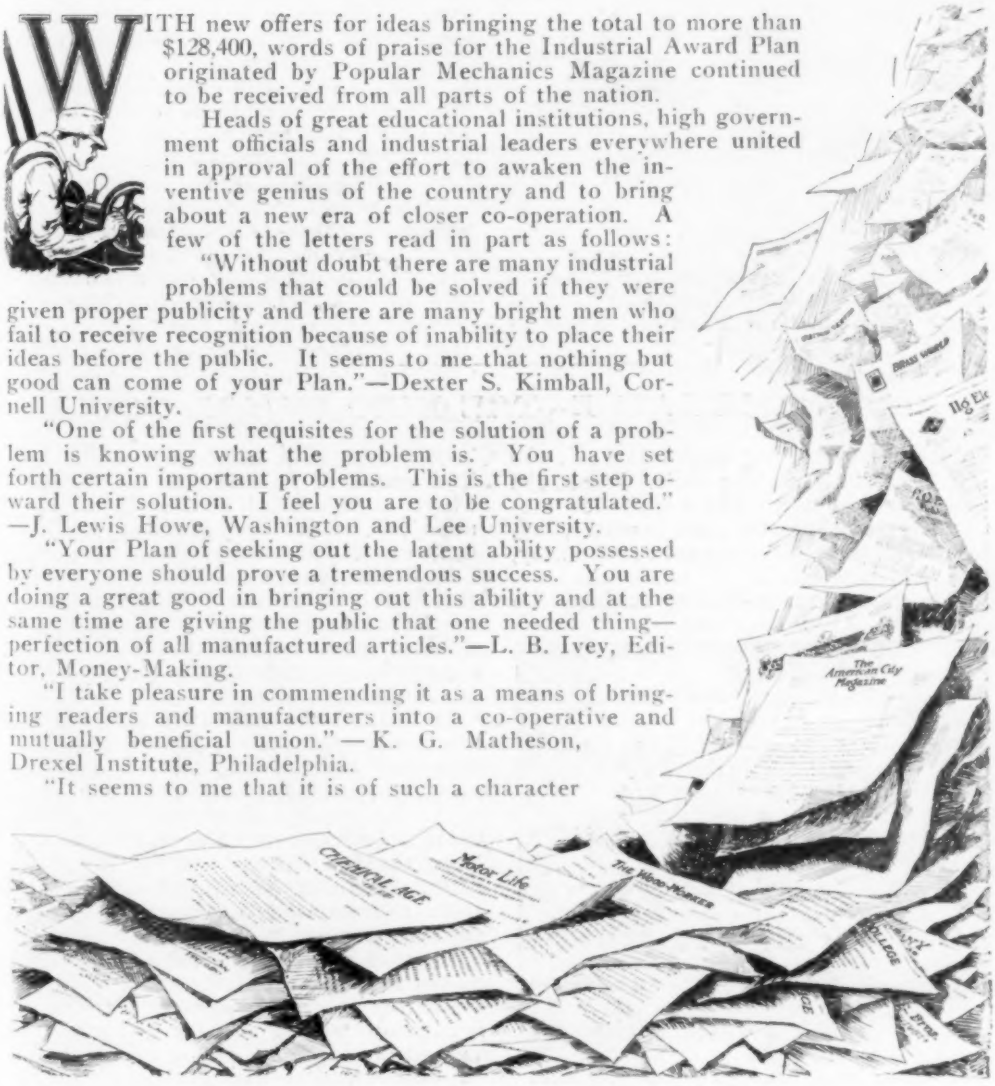
"Without doubt there are many industrial problems that could be solved if they were given proper publicity and there are many bright men who fail to receive recognition because of inability to place their ideas before the public. It seems to me that nothing but good can come of your Plan."—Dexter S. Kimball, Cornell University.

"One of the first requisites for the solution of a problem is knowing what the problem is. You have set forth certain important problems. This is the first step toward their solution. I feel you are to be congratulated."—J. Lewis Howe, Washington and Lee University.

"Your Plan of seeking out the latent ability possessed by everyone should prove a tremendous success. You are doing a great good in bringing out this ability and at the same time are giving the public that one needed thing—perfection of all manufactured articles."—L. B. Ivey, Editor, Money-Making.

"I take pleasure in commending it as a means of bringing readers and manufacturers into a co-operative and mutually beneficial union."—K. G. Matheson, Drexel Institute, Philadelphia.

"It seems to me that it is of such a character



as to offer encouragement in a more substantial and general and protected way than almost any other plan which might be devised."—E. T. Stiger, Editor, Printing Art.

"Popular Mechanics Magazine, always a favorite with men who use their heads as well as their hands, is performing a most valuable service to industry and mankind by encouraging men to do things better. You have my sincere congratulations."—J. A. Gary, Editor, Furniture Age Magazine.

"You are rendering the industries of this country a useful service in making your splendid publication the focal point at which important problems and their solutions are brought together."—Ernest Coler, Editor, Motor Life.

"Your enterprise will bring the manufacturer and the inventor together to their mutual advantage and the entire nation will profit."—John M. Glenn, Secretary, Illinois Manufacturers' Association.

"Your Plan will lead to considerable benefit and it will not be at all surprising if some rather radical improvements result from it."—L. D. Crain, State Agricultural College, Fort Collins, Colo.

"Your Plan provides a number of definite lines along which there is a need of investigation and invention and ought to yield useful results."—O. M. Leland, The University of Minnesota.

"It seems to me that your Plan should produce excellent results. Anything that will encourage investigations and discoveries is certainly worth while."—Charles H. Warren, Yale University.

"It is an interesting proposition which you are placing before the public. It constitutes an incentive to some who might never think of developing their idea in form to go to the patent office."—P. F. Walker, University of Kansas.

"I am glad to see your magazine working along such constructive and edifying lines."—A. M. Soule, University of Georgia.

"I think that this kind of competition opens up a wide field of interest and frequently results in useful and sometimes very valuable suggestions."—H. J. Hughes, Harvard University.

"Many people with inquiring and active minds will welcome these definite suggestions to which they may direct their efforts."—H. S. Evans, University of Colorado.

"This seems to me to be a very good means of bringing inventors and those who have problems which they would like to solve together for the mutual advantage of both."—C. D. Marx, Stanford University.

ABOUT THE LATHE—THE KING OF ALL TOOLS

THE screw-cutting engine lathe is the oldest of all machine tools. It was the first developed and without it the locomotive, the steamboat, the electric motor, and, in fact, all the machinery used in industry, would be impossible.

The earliest screw-cutting engine lathe known was built in France about 1740. The name of the builder is unknown. There was not much further development until 1797, when Henry Maudslay, an Englishman, designed and built one with about a ten-inch swing, fitted with a lead screw geared to the spindle. Although only a few lathes were built until after 1830, nevertheless they have made the United States the greatest manufacturing country in the world today.

Two-Man Hand-Power Lathe of the Orient

It was on the lathe that the pioneer mechanics got their early training and developed special tools for cutting costs, increasing production and improving products. Now many of the vocational and industrial schools offer an opportunity to learn the fundamentals of machine-shop work. The lathe, of course, is the basis of these courses, and the average boy who spends two years in the machine shop of a vocational or industrial school is sought by the manufacturer.

But the boy who takes up such work is not expected to spend the rest of his life as a machinist, for he has received a training that will give him an opportunity to

become a foreman, superintendent or manufacturer. George Westinghouse, Henry Ford and the Studebaker brothers were all mechanics.

While there are excellent mechanics and skilled workmen in the large industrial plants contributing their part in improvements and inventions to industry, there are also a great many unknown craftsmen in the smaller shops and communities throughout the country who are doing their bit, as the following story will serve to illustrate:

In 1890, a young tool and die maker entered the employ of one of the largest brass manufacturing concerns in Connecticut. An order came in for a large amount of curtain brackets. The foreman and the die maker worked out a set of tools for making the bracket in quantities, and at the end of two months, the tools were set in operation and a production of 8,000 brackets a day was obtained. The young die maker's reputation was made in that community. Later he became a machine-tool salesman and visited a small shop, the equipment of which did not cost more than $4,000. On the floor was a horizontal machine for the turning out of the very same curtain brackets that he had worked on ten years before in New England, except that this bracket was made of steel instead of brass; and this machine had a production capacity of 40,000 brackets a day.

The machine was crudely built, of poor design, but the dies and tools did the work. The mechanic who built it did not realize what ability he had. He did not seem to think it much of a job, but he had developed alone a machine which had five times the capacity of that built in the eastern plant with all its equipment and experience of the builders.

This goes to show that in the United States there are a great many people of unusual mechanical ability if they only had the opportunity to develop it. They

do not always know they have this ability, and it is to stimulate it and show the way to constructive achievement that the following problems, including several on the lathe, are presented:

No. 14—$1,000—Harmless Skyrocket Stick

The Thearle-Duffield Fireworks Company, producers of fireworks displays and spectacles, will pay to the designer of a skyrocket equipped with a stick absolutely harmless in its descent after explosion in the air, the sum of $1,000. Models or clearly defined ideas are acceptable to this company, who will be the sole judge of the article and its value to them.

No. 14A—$250—Bombshell with Flag

This concern will pay the sum of $250 for a satisfactory night bombshell that will release, at an altitude of 600 to 800 feet, a large silk American flag attached to a parachute together with an illuminating compound that will function in such a manner as to safely and satisfactorily illuminate the flag so that it may be clearly seen as it floats in the air.

No. 14B—$250—Smokeless Colors

For a combination of chemicals that will produce smokeless, or nearly smokeless, colors when burning, the Thearle-Duffield Fireworks Company will pay the sum of $250. The colors produced are to be in solid reds, blues, yellows, greens and white. The main object is to secure a smokeless combination that will prove acceptable to this organization. Offers 14, 14A and 14B close May 1, 1925. Address Thearle-Duffield Fireworks Company, 624 South Michigan Avenue, Chicago, Illinois.

No. 15—$10,000—Motorized Handsaw

With the person who designs a successful and acceptable means of motorizing the ordinary handsaw, R. L. Barker and Company will enter into an agreement to manufacture and market such device and award to the inventor royalties from the sales until such time as the royalties aggregate the sum of $10,000, when the payments shall cease and all rights to and ownership of the implement will pass to R. L. Barker and Company. The saw must be of the reciprocating type. We have in mind three sizes; one driven by a ½-hp. motor, with 16-inch blade, 14-inch stroke, to cut 12-inch timbers, and weighing about 25 pounds; another driven by a ¼-hp. motor, with 6 or 8-inch blade, with 4 or 5-inch stroke, to cut 4-inch timbers; this would be the most popular size, selling in almost every field where handsaws are used. The third size should take a smaller motor, about a 4-inch blade with stroke of 2 or 3 inches, to cut very light materials, such as veneer and wallboard, or for shaping showcards and stage scenery. The difficulty in properly designing the implement, it seems, would be to get uniform pressure on the saw blade while it is being drawn back and forth by the motor. R. L. Barker and Company will be the only authority to judge of the suitability for their purpose of all designs submitted. This offer will terminate on May 1, 1925. Address R. L. Barker and Company, 642 West Washington Street, Chicago, Illinois.

No. 16—$500—Sales Promotion Plan

The Keasby and Mattison Company has a neutral product which is very light and fluffy, and of use as an absorbent, as a non-heat-conducting powder, as a neutral powder to be mixed with arsenite of lead or other insecticides, or for any sort of disinfectant, for air supplying, dusting, etc. We desire a price of about three cents a pound for this material. It is mainly of a very light and fluffy chalk and is exceedingly bulky. A large sugar barrel can be made to hold about 100 pounds of the powder, 95 per cent of which will pass through a 400-mesh screen. For a satisfactory plan that will aid in largely increasing our sales of, and assist us in marketing, the product, we will pay the person submitting the plan, the sum of $500, Keasby and Mattison Company alone to determine the value of the method. The offer will end on May 1, 1925. Address Keasby and Mattison Company, Ambler, Pennsylvania.

No. 17—$15,000—Mechanical Devices

The Aetna Industries, Incorporated, manufacturers of mechanical and labor-saving appliances, such as automatic oil burners, camp stoves, rivet heaters, illuminating lamps, portable shower baths, burglar-proof window locks, lawn sprinklers, rotary pumps for air and liquid, and hand drills for steel, iron, etc., will undertake the manufacture of an entirely new and original device either in the line of their own products aforementioned or any other labor-saving devices, mechanical or electrical, that are practical and will gain the endorsement of this organization. To the inventor submitting such article, this concern offers the following terms: They will enter into a contract to make and sell the new or improved device and award to the inventor royalties from the sales until such time as the royalties will aggregate the sum of $15,000, when payments shall cease and the improved or new device shall become the sole property of the Aetna Industries, Incorporated. No person connected with this concern will receive any consideration under this offer. All ideas must be submitted in form of models, as no sketches, plans or blueprints will be accepted. Examining committee will be R. S. Brandt, president, A. Pettersson, vice president, of this organization, and J. J. Berggren, technical superintendent of the Essanay Film Manufacturing Company. The offer closes May 1, 1925. Address Aetna Industries, Incorporated, 117 North Dearborn Street, Chicago, Illinois.

No. 18—$250—Article for Manufacture

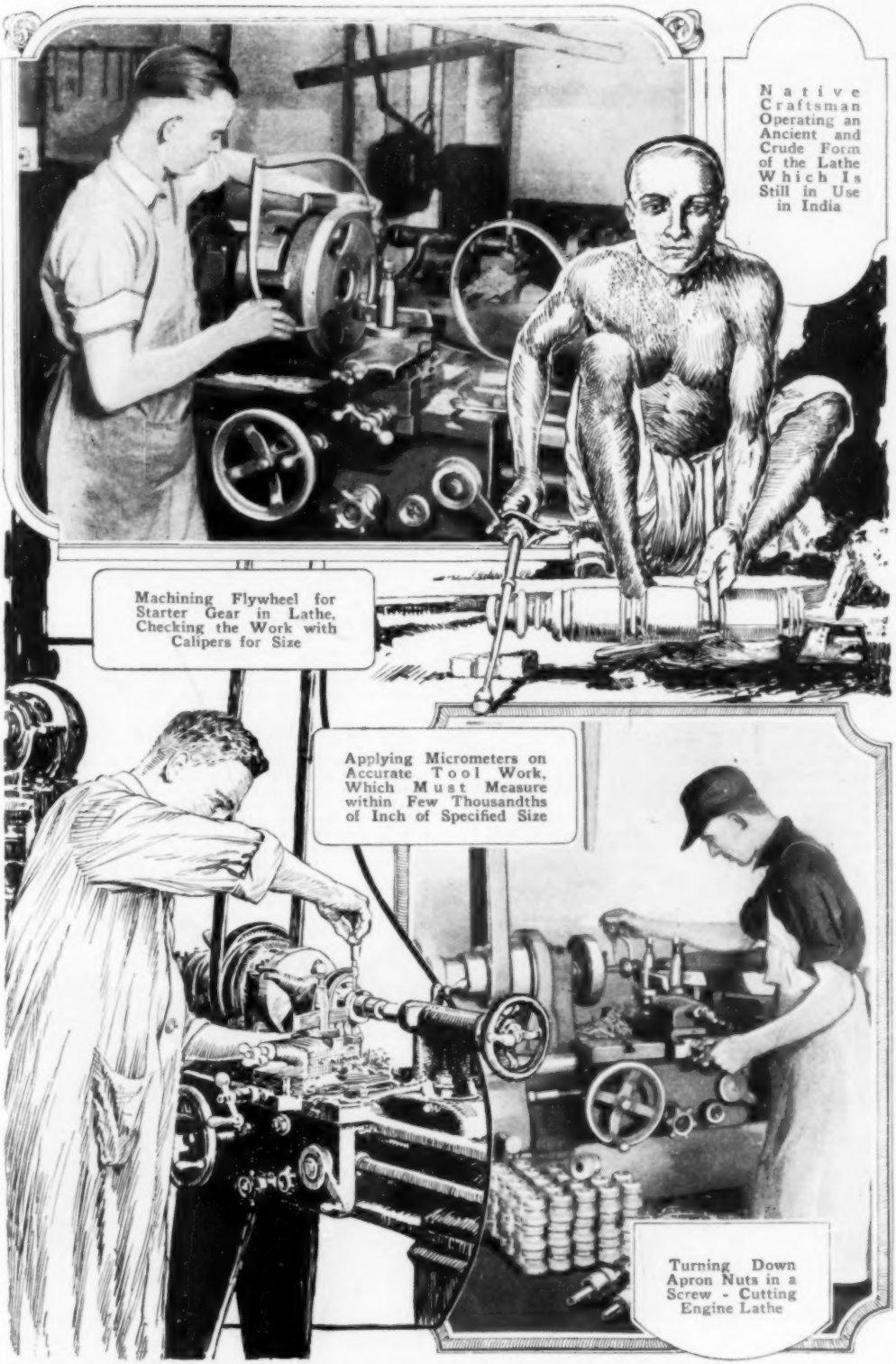
The Gemco Manufacturing Company will pay the sum of $250 in cash to the person submitting to them a fairly well developed article that can be manufactured in an ordinary general metal-working plant equipped with a line of medium-heavy punch presses, screw machines, automatic machinery, polishing and plating departments, and complete tool and diemaking and experimenting departments, etc. This also applies to the one submitting a suggestion that leads to the acquirement of such article by this concern. We are in search of some good live accessory to manufacture and sell to the automotive trade, or an article that will market readily through the hardware trade and which may be applicable to almost any field—to the farmer and any other large class of users. Value of the article to us will be determined entirely by members of our organization, and its merits will be largely measured by its adaptability to our sales organization. The award, as offered here, means a payment over and above any agreements into which we might enter with an owner of the rights to such accepted article for manufacture in case he is the one to submit the idea we adopt. Our offer will be closed on May 1, 1925. Address Gemco Manufacturing Company, Milwaukee, Wisconsin.

No. 19—$25—Leakproofing Cast Iron

This donor will pay the sum of $25 in cash for a satisfactory, simple and inexpensive method by which they can make cast-iron vessels, about 4 inches wide, 9 inches deep, and of ⅛ to 3-16-inch metal, proof against leakage of kerosene. It seems that the metal is open sufficiently in the grain to allow seepage, and so far their efforts to apply a coating on the inside of the vessel to close the pores and resist the action of the kerosene have been unsuccessful. Their offer expires May 1, 1925. Address Problem SC-1, Popular Mechanics Magazine, Chicago, Illinois.

No. 20—$1,000—Untarnishable Silver

The Stieff Company, silversmiths, will pay the sum of $1,000 in cash for a perfected process or method whereby finished silver can be coated by some transparent material of a permanent and satisfactory character which will not in any way detract from its appearance or use and which will prevent tarnish. Or, the plan may be such that some alloy could be introduced into the composition of the metal which will not be detrimental to its quality, appearance or use, and yet will permit it to retain a fixed and permanent brilliance and luster absolutely immune to tarnish. The plans, methods, and processes submitted must necessarily be proven by qualified tests and demonstrations on the part of our concern, and the one selected by us must be only of such character as will warrant its adoption. This offer will terminate May 1, 1925. Address The Stieff Company, 17 North Liberty Street, Baltimore, Maryland.



Native Craftsman Operating an Ancient and Crude Form of the Lathe Which Is Still in Use in India

Machining Flywheel for Starter Gear in Lathe, Checking the Work with Calipers for Size

Applying Micrometers on Accurate Tool Work, Which Must Measure within Few Thousandths of Inch of Specified Size

Turning Down Apron Nuts in a Screw - Cutting Engine Lathe

Courtesy South Bend Lathe Works

No. 21—$1,000—Saxophone Reed

The Buescher Band Instrument Company will pay the sum of $1,000 in cash to anyone who will produce for them a reed for a saxophone that will give the same results as the present reed but which must be indestructible in so far as ordinary care is concerned. This idea has received a great deal of attention in the past from many people, but nothing has been developed to satisfactorily replace the present cane reed. All kinds of metal, ivory, wood, rubber, celluloid, and other materials have been tried without success. All entries must be in the hands of this company, who will act as sole judge of their worth, by May 1, 1925, the date on which this offer closes. Address Buescher Band Instrument Company, Research Department, Elkhart, Indiana.

No. 22—$1,000—Clamp for Rubber Bottle

Dr. Goddard Nurser Co., Inc., manufactures a collapsible all-rubber nursing bottle for babies. It has been in the market for some time and has proved a success. However, this firm is desirous of procuring an improvement over the present clamp used to close the bottom of the bottle. While our device is satisfactory for its purpose, it is difficult for many lady folks to remove without great effort. We will pay the sum of $1,000 to the person submitting a device that will satisfactorily perform this service and which will be easy to remove and replace without becoming damaged under ordinary usage. Any device or plans submitted must be passed upon by Dr. Goddard Nurser Co., Inc., representatives who alone will decide on the merits of the suggested appliances. Persons interested in working on this clamp are to write us at once for particulars. This offer ends May 1, 1925. Address, Dr. Goddard Nurser Co., Inc., Fort Atkinson, Wis.

No. 23—$1,000—New Variable Condenser

The Phenix Radio Corporation will pay the sum of $1,000 in cash for the design of a new form of variable condenser for radio reception. It must be a departure from the common rotary plate type, the mercury type and the type relying on the decrease of distance between two conducting surfaces for an increase of capacity. The variable condenser must be no larger than the rotary plate type, for a given capacity, and preferably smaller. It must have a gradual straight line curve and have its entire variation through 180 degrees. The new device must not be so complicated in design that the cost of manufacture would exceed that of the present forms of rotary plate condensers. All submitted designs are subject to sole judgment of the Phenix Radio Corporation, who will decide on the value of the device to their organization. May 1, 1925, is the closing date for this offer. Address the Phenix Radio Corporation, 5 Beekman Street, New York, N. Y.

No. 24—$500—Portable Electric Hammer

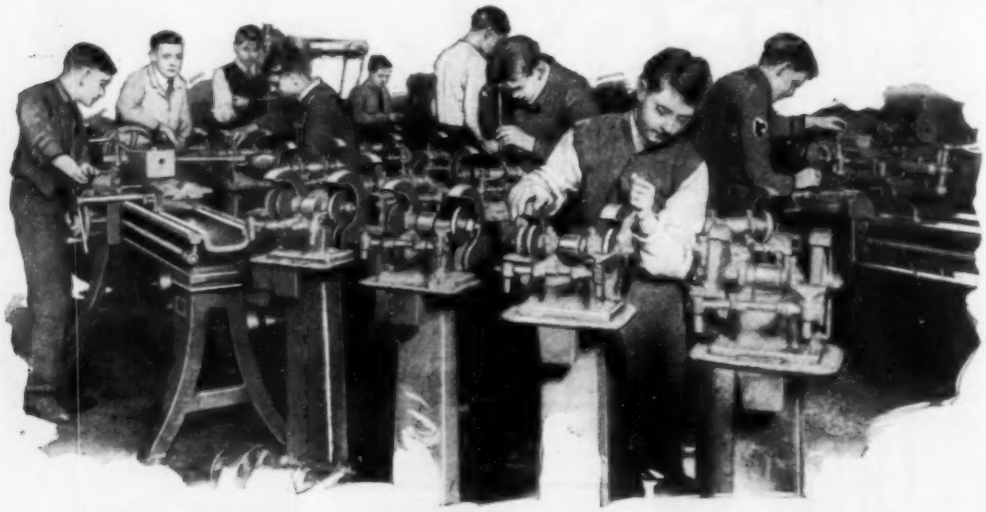
Wodack Electric Tool Corporation desires a hammer arrangement for an electrically driven portable hammer drill other than a lifting cam and spring. The idea is to secure an electric drill strong enough to drill holes, ¼ to 1 inch in diameter and from ½ to 6 inches deep, in stone or concrete. Such a tool should weigh less than 25 pounds. What we need primarily is a motion that will strike a powerful hammer blow. Our present hammer delivers 2,000 blows a minute, but they are not hard enough. To enlarge the spring of the lifting cam and spring arrangement would call for a larger motor than that used. Perhaps some combination could be introduced to increase the force without such a change. The purpose of the tool must be to drill a 1-inch hole in concrete at the rate of 1½ or 2 inches a minute. For a practical, workable plan or model of a portable hammer drill arrangement that we accept and which proves satisfactory, we will pay the sum of $500. The offer will expire May 1, 1925. Address Wodack Electric Tool Corporation, 23 South Jefferson Street, Chicago, Illinois.

No. 25—$2,500—Rubber Products

Continental Rubber Works, manufacturers of a nationally known line of automobile accessories, are interested in ideas or suggestions for any new accessories or improvements on existing accessories which are made from rubber, rubber and fabric, or rubberized fabric. Articles to be acceptable must preferably be simple in construction and application, of general appeal and subject to wide use to insure volume sales, and should possess sufficient originality to make them patentable. Continental Rubber Works is to be the sole judge in determining what suggestions are acceptable to this concern, and in the event of the adoption of any suggestion, will enter into a contract to make and sell the article and will pay to the inventor royalties of five per cent of the sales until such time as the royalties amount to a sum ranging up to $2,500, according to the possibilities of the article; whereupon such payments to the inventor shall cease and the article together with all patent rights thereto shall become the sole property of Continental Rubber Works. Our offer expires May 1, 1925. Address Continental Rubber Works, Erie, Pennsylvania.

No. 26—$100—Switch for A. C. Motor

This donor will pay the sum of $100 for an accepted design of a starting switch for an alternating-current motor. The switch must operate so as to open the starting winding of split-phase, alternating-current electric motors at a predetermined speed. It must break quickly a current of about fifteen amperes at a speed of approximately 500 r. p. m. The diameter cannot exceed 4⅞ inches by about 1½ inches in length. Operating



Youthful Students of the Boston Continuation School at Work in One of the Lathe Classrooms

Lathe Section of Springfield, Mass., High-School Machine Shop

Teaching Student Proper Method of Adjusting Lathe to the Work

speed must be adjustable to some extent. Submit drawings and descriptive explanation. Closing date for this offer is May 1, 1925. Address Problem Number PD-1, Popular Mechanics Magazine, Chicago, Illinois.

No. 27—$5,000—Leather Scrap Uses

This concern, the Eisendrath Glove Company, wants a new method whereby the scrap leather in our glove factory can be profitably utilized. Over thirty per cent of the leather, horsehide, cowhide, sheepskin, etc., that we cut is lost in scraps. Is there an automobile floorboard, composition floor covering or fabric capable of being developed from these waste pieces? The acceptable plan, process or method of some profitable utilization of this waste material is worth $5,000 to us. We will pay this sum in cash to the person submitting the solution of this problem which we adopt. All ideas and suggestions are subject to the judgment of this firm alone. Our offer expires May 1, 1925. Address, Eisendrath Glove Company, 2001 Elston Avenue, Chicago, Illinois.

No. 28—$200—Best New Use for Slate

In line with the efforts of the National Slate Association to promote and extend the uses of slate as illustrated by their slogan, "Slate—Consider Its Uses," the association will pay the sum of $200 for the best suggested new use received before May 1, 1925, the date of expiration of this offer. In addition to the above offer, cash payments in proportion to their value to our members in the industry, will be given for all suggestions having reference to the production, distribution, and use of slate and slate products, not already known to our members, and which they adopt. Address, National Slate Association, 761 Drexel Building, Philadelphia, Pennsylvania.

No. 29—$50—New Use for Ground Slate

Owing to the tremendous use of crushed and ground slate in various construction and industrial processes, the Parsons Manufacturing Company is interested in extending such uses and will pay the sum of $50 for the best suggested new use for ground slate received before May 1, 1925, the date of expiration of these offers. In addition to the above award, cash payments in proportion to their value will be given for all suggestions having reference to the production, distribution and use of crushed and ground slate not already known to us, and which we will adopt. Address, Parsons Manufacturing Company, Pen Argyl, Pennsylvania.

No. 30—$500—Uses for Generators

For three new uses for low-voltage generators, 2-10 volts, besides plating, electrotyping, and battery charging, that will produce $50,000 additional sales volume to this concern, through such new uses, William H. Mitchell Company will pay the sum of $500, one-fourth of the amount at the time we adopt the suggestions, and the balance in three equal payments, one every three months until full amount is paid.

No. 30A—$500—Motor Generator Set

For a simple design of 2-kw. motor-generator set (or rotary converter) in which the single-phase synchronous motor obtains excitation from the 6-volt generator it drives, and one which is accepted by this concern, we will pay the sum of $500. The outfit

must have good starting torque and unity power-factor characteristics. Offers 30 and 30A will close on May 1, 1925. Address, William H. Mitchell Company, Troy, Ohio.

No. 31—$500—Anti-Freezing Ingredient

We have an emulsified asphaltic concrete which consists of 70 per cent petroleum asphalt of from 90 to 110 penetration and a 30 per cent water and soap solution. The addition of alcohol would keep the material from freezing out in the cold weather but would be highly expensive and the ingredient used for this purpose must not add more than 1 per cent to the present cost of the product. We will pay the sum of $500 to the person who can give us an acceptable and satisfactory formula, process, ingredient, or method by which the freezing out of the emulsion can be prevented in cold weather. This offer expires May 1, 1925. Address, S. D. Hofheimer, Land Title Building, Philadelphia, Pennsylvania.

No. 32—$500—Gasoline Mower

The Granite State Mowing Machine Company will pay the sum of $250 in cash and $2.50 each royalty on the first one hundred machines sold for satisfactory working drawings of a gasoline motor lawn mower which we accept for manufacture and sale. This must be a practical walking type motor-driven lawn mower, 20 inches or 24 inches cut, with a simple compact power unit such as the small motors made by Briggs and Stratton Company, Milwaukee, Wis., that will drive and operate a lawn mower about the size and type of the ordinary 20-inch hand lawn mower, and that will be suitable for general use and can be manufactured complete for $50 or less. Motor must propel both mower and cutter and operator must be required only to guide mower. This organization will be the sole judges in reaching a decision regarding the worth of the design to us. Our offer ends May 1, 1925. Address, Granite State Mowing Machine Company, Hinsdale, New Hampshire.

No. 33—$5,000—Hoist for Dump Trucks

The Continental Car Company of America will undertake the manufacture and marketing of an original design hoist for dump bodies operated by motor vehicle, said hoist to be operated from the driver's seat by power from the engine. This invention or improvement must be different from devices now in use for such purposes, must be simple in construction, inexpensive to build and efficient. It must do the work of a hoist satisfactory to our engineering department, and it must be acceptable to our distributors located in the principal cities throughout the United States. This hoist must be so designed that it can be used, by increasing the size of the parts, for dumping bodies of from one-ton to five-ton capacity. To the inventor of such a hoist which meets the approval of our engineering department, the donor offers the following proposition: The donor will enter into a contract to make and sell these hoists in connection with their truck bodies and will pay the inventor royalties, if a basic patent on the hoist is secured, aggregating the sum of $5,000, in the following manner—royalties are to be paid the inventor in amount not to exceed one per cent of the net sales price of the complete body and hoist when and as the bodies and hoists are sold, until the full amount of the $5,000 has been paid to the inventor, at which time payments shall cease and the invention or improvement becomes the sole property of the Continental Car Company of America, Inc., or its assigns. A working model of the hoist should be submitted so our engineering department can judge of its value. Written descriptions, drawings, sketches, etc., will receive consideration but we prefer to have a workable model.

No. 33A—$1,000—Article of Furniture

This concern also will pay the sum of $1,000 in an arrangement similar to that above outlined, for a new toy for a child, or a new useful article of household furniture made principally of wood parts formed from the lumber offal from manufacture of wooden truck bodies. We prefer that this article be something of use in connection with radio that would prove to be an attractive accessory to the public. This firm will be the sole judge of the article's merits.

No. 33B—$5,000—Air Car-Dumping

For air-dumping equipment which meets with the approval of the Continental Car Company of America's engineers—and to meet with their approval, among other things, the dumping equipment must not only dump the car but right it to a horizontal position and lock it—the donor agrees to pay the inventor the sum of $5,000, provided a basic patent can be secured, in the following manner: The donor is to pay a royalty of $50 on each and every car sold with this equipment installed thereon when and as the cars are sold, until the full sum of $5,000 in royalties has been paid to the inventor, at which time payment of royalties shall cease and the invention is to become the sole property of the Continental Car Company of America, Inc., or its assigns. If the dumping device is not patentable, but in the opinion of the donor is new and useful and is used by the donor, then a smaller amount is to be paid to the entrant, said amount to be fixed by the directors of the Continental Car Company of America. Detail drawings may be submitted to the donor instead of a model. In operating the projected car, it must be so designed as to dump on either side of a track and the act of dumping is to be accomplished with compressed air furnished by the locomotive and operated by the engineer from the cab.

No individual connected in any way with the Continental Car Company of America may participate in offers 33, 33A and 33B, all of which will terminate May 1, 1925, unless extended by special arrangement between donor and any entrants. Address, Continental Car Company of America, Louisville, Kentucky.

No. 34—$1,000—Cost Reduction

This concern makes the Kirstin Fil-Gage for filling Ford automobile gasoline tanks under the seat without need of removing the cushions. It has an indicating gauge in plain sight of the driver at all times and is attached to the tank opening in place of the cap. The Fil-Gage is made of black-finished sheet metal. Our factory operates in large production, and for any accepted improvements not yet tried out or developed which will increase the efficiency of this filler and gauge and decrease manufacturing costs, we will pay the sum of $1,000. Or, we will pay this amount for any suggested changes, satisfactory to us which will reduce the production cost 20 cents on each article. No theoretical suggestions will be considered. To qualify, entrants must have actually tried their improvements in operation on one of the devices and have proved it practical and workable. The Fil-Gage containing the improvement must be sent to us by registered mail for testing and upon acceptance and the assigning to us of patentable rights, we shall pay the amount stated to the entrant whose ideas we adopt. This offer expires May 1, 1925. Address, A. J. Kirstin, General Manager, A. J. Kirstin Company, Kirstin Bldg., Escanaba, Michigan.

No. 35—$300—Sheet-Metal Key Guide

We make a key guide surrounded by an oval escutcheon plate. The oval plate is made of .035-inch sheet metal and the key guide is a die-cast article. Our plan is to design a key guide of sheet metal that will properly fit the oval plate or one of similar form. The guide is inserted through the center of the escutcheon and protrudes beyond it. For a satisfactory arrangement that will be as cheap as the die-cast guide we now use, and one that we accept, the National Brass Company will pay the sum of $300. This offer ends May 1, 1925. Address, National Brass Company, Grand Rapids, Michigan.

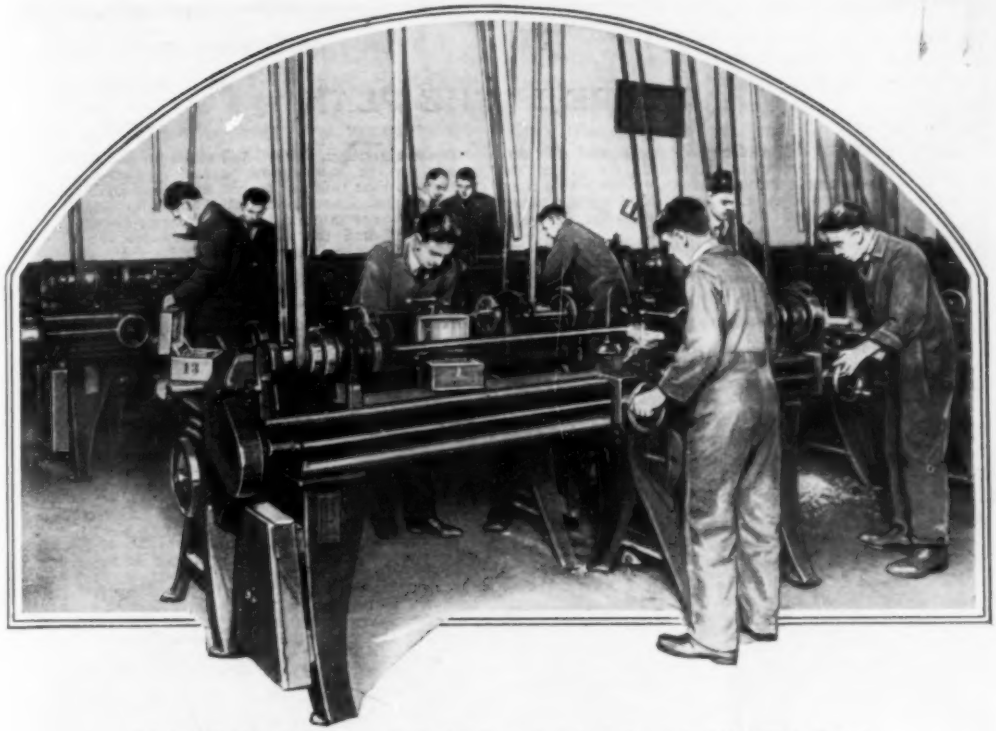
No. 36—$1,000—Improvements to Lathes

In four awards of $500, $250, $150, and $100.

These awards will be paid for the four best ideas for new and practical attachments for a screw-cutting engine lathe. The mechanical application and the idea must, of course, be heretofore untried and original and may consist of a distinct improvement on an attachment now in use or a direct improvement on any part of a screw-cutting engine lathe. Value and merit of improvements or suggestions will govern the order in which the allotments of the four awards will be made. The offer expires May 1, 1925. Address all suggestions to South Bend Lathe Works, 423 East Madison Street, South Bend, Indiana.

No. 37—$500—Anti-Carbon in Oil Burner

The Aeroil Burner Company will pay the sum of $500 in cash to the person who develops for them a practical inexpensive means by which carbonization can be prevented in portable oil burners of the vaporizing type such as we manufacture. Such a method may consist of different construction from that we now employ; a change in the design or the use of another kind of



Scholars Taking Instructions in Lathe Operations in Lakewood, Ohio, High School

metal. The process may also include or consist of the use of an inexpensive chemical which could be mixed with kerosene. Whatever the plan, if it can prevent carbonization in our oil burners and we accept the process after it passes our tests, we will pay the amounts stipulated herein. This offer expires May 1, 1925. Address, Aeroil Burner Company, 266 Hudson Avenue, Union Hill, New Jersey.

No. 38—$10—One-Dip Enamel

For a white enamel which will satisfactorily cover black sheet steel in one application by the dipping process the Patent Novelty Company will pay the sum of $10 in cash. The material will be subject to trial by our own organization before adoption. The offer ends May 1, 1925. Address, Patent Novelty Company, Fulton, Illinois.

Many Additional Offers Will Appear in the SEPTEMBER ISSUE

OFFERS ANNOUNCED IN PREVIOUS ISSUES

All of These Offers Expire May 1, 1925

NO. 1—THE YELLOW CAB MANUFACTURING Company offers an award of $50,000 for a perfected plan of traffic and pedestrian correction and regulation, including mechanical devices, regulations, etc., for the promotion of greater street safety.

NO. 2—$10,000 FOR A NEW MUSICAL INstrument which can be incorporated in any orchestra or brass band and will take a place among the present family of musical instruments accepted by the rank of players.—Lyon and Healy, Inc.

NO. 3—FOR THE BEST SUGGESTED IMprovement on a gasoline-heated blowtorch and soldering and branding iron combined, an award of $500 will be paid by the Everhot Manufacturing Company.

NO. 3A—$200 WILL BE PAID BY THE ABOVE concern for the best suggested new use for the device named in Problem 3. Other cash awards in proportion.

NO. 4—PROCESS BY WHICH ZINC THAT oxidizes and is lost in brass foundries can be saved and used. Award $500.

NO. 4A—PLAN BY WHICH LEATHER wasted in making of belting, etc., can be disposed of at profit to manufacturer. Award $100.

NO. 5—AWARDS OF $500 EACH WILL BE paid for a waterproofing process for a library paste and a method that will produce increased sales of this product. John J. Harris and Company.

NO. 6—FOR PRACTICAL METHOD OF ANchoring electric light clusters to vases, urns, etc., to convert them into lamp stands, $250.

NO. 6A—FOR MOST WORKABLE PLAN whereby such lamps can be made from material found in shops of electrical contractors and dealers, $150.

NO. 6B—BEST SALES SCHEME WHICH WILL promote business of making lamp stands for dealers, $100. Above three problems by Benjamin Electric Mfg. Company.

NO. 7—WHAT CAN BE MANUFACTURED BY plant specializing in making bicycle wheel rims? Award $5,000.

HERE IS THE PLAN

1. All offers of awards made, and all solutions of problems submitted, are subject to these terms and conditions, except where they are in conflict with or modified by the terms of the offer. In that case the offer controls.

2. The one offering the award is hereinafter called the "Donor," and the one submitting a solution the "Entrant."

3. All proposed solutions shall be mailed or delivered as directed in the offer.

4. The donor shall pay the award to the entrant who submits a solution of donor's problem which is complete, practical and economically sound and satisfactory, to, and not already known to, the donor.

5. The donor shall have the period of one year from the receipt of any proposed solution to pass upon it, and, in case it be regarded as a partial solution, to agree with the entrant as to the amount of the award. During that one-year period the entrant shall not offer or submit said solution, or any part thereof, to any one else.

6. If the donor shall not have paid the whole or any part of the offered award mutually satisfactory to any entrant within said one-year period, unless entrant agrees to an extension of time, the donor shall return to such entrant by mail the solution submitted by him. If the entrant had the right to submit such solution, donor shall make no use of such or the information given, provided, however, that nothing herein contained shall prevent the donor from using any solution, idea, device or information which donor knew about and had the right to use before the receipt by the donor of such entrant's solution.

7. Any patent on, or any patentable feature of any entrant's solution accepted and paid for as herein provided, shall belong to the donor, and entrant shall assign to the donor any such patent already issued and any invention for such a patent on which applications shall have been made. And entrant, at donor's request shall execute all such applications, assignments and other documents as may, in donor's judgment, be necessary or expedient for the purpose of obtaining a patent on entrant's solution, or any feature thereof, such patent to be issued in the name of, and to be the sole property of the donor.

8. Popular Mechanics Magazine shall receive no fees or commissions, directly or indirectly, for publishing any offer made through this department, nor for anything it may do in connection therewith. And the publisher is not and shall not be held responsible for the performance of any obligation either of a donor or an entrant. The publisher's responsibility ceases with the publication of the offer.

Entrants may sign and accompany their solution with the following:

To.....
(Here write name of firm to whom your solution is offered.)

CITY....., STATE.....

Dear Sirs:

Enclosed find my solution of your problem, published in Popular Mechanics Magazine. I hereby submit my solution to you for examination, subject to the terms and conditions published in said magazine, in connection with your offer.

NAME .....

ADDRESS .....

NO. 8—IDEAS SUGGESTING NOVEL, PRACtical and valuable uses for Ilg ventilating fans, blowers and unit heaters. Proportionate awards aggregating a total of $5,000 will be paid by Ilg Electric Ventilating Company.

NO. 9—FOR A SOLUTION OR METHOD which will eliminate "dry effect" that occurs in the process of photo-engraving the sum of $500 will be paid.

NO. 9A—PERFECT IMPROVEMENT IN COLor separation process used by photo-engravers, $500.

NO. 9B—PLAN BY WHICH A PERFECT etching could be made by a one-depth "bite" of etching acids reducing costs of this kind of engraving, $500. Above three problems by Jahn and Ollier Engraving Company.

NO. 10—ELECTRIC HEATING ELEMENT which will operate and interchange with base and cover of Imperial self-heating gasoline iron, $500. Imperial Brass Company.

NO. 11—$100 FOR PLAN OF PROFITABLY disposing of chamois skin scraps. Bassick Manufacturing Company.

NO. 12—DISCOVERY OF NEW USES FOR carbon-dioxide gas or improvements to present uses. Award $1,000.

NO. 12A—FOR AN AUTOMATIC FREEZEproof soda cooler adaptable to "iceless" type of soda fountains, $1,000. Above two problems by Liquid Carbonic Company.

NO. 13—$2,000 WILL BE PAID IN SEVERAL awards for processes and machines for salvaging waste lumber, National Lumber Manufacturers' Association.

Full Details Regarding the Previous Offers Listed Above and Numbered from One to Thirteen, May Be Obtained by Addressing the Bureau of Information, Popular Mechanics Magazine.

Photos Sent over Telephone Wire Are Accurately Reproduced

Transmission of photographs from Cleveland to New York City over long-distance telephone lines was recently accomplished in a demonstration by laboratory experts of the American Telephone and Telegraph company. The method, achieved after several years' work, was described by officials of the company as a "simple, rapid and accurate transmitting system." It will be installed on the company's various long-distance lines, it was announced, as demand may arise for this type of service. Cleveland was selected as the place for the transmitting station so that pictures taken at the Republican national convention might be sent to New York within a few minutes. The tests showed that photographs could be transmitted and made ready for producing newspaper plates within ten minutes from the time the original picture was put on the machine. Messages in handwriting were also sent, the copy received being a facsimile of the original. In sending a picture, the original is placed around a cylinder within which there is a photo-electric cell. On another cylinder in the receiving office an unused film is placed. Both cylinders revolve in synchronization.

Machine Which Receives or Sends Pictures by Telephone, and Photographs of Baseball Players and of President Coolidge That Were Received on It

Copyright, Keystone View Co.

During the operation a very small but intense beam of light is thrown on the original photograph, passing through it to the photoelectric cell with an intensity proportionate to the lights and shades of the picture. By the aid of a new device known as a light valve, a beam of light, varying in intensity in exact correspondence with the original beam received by the photoelectric cell, is thrown on the film in the receiving office. The receiving cylinder revolves and the ray of light gradually moves from one end of it to the other. Then the film is ready for development.

Floats in Safety Parade Teach Dangers of Carelessness

Calling attention to the dangers lurking in carelessness and disobedience of traffic rules, floats in a "safety day" parade in New York depicted penalties resulting from neglect of vehicle drivers and pedestrians to observe the laws governing the streets of the city. The displays pointed out the extent of the annual death list due to accidents occurring on thoroughfares within the limits of the city, and portrayed various types of careless citizens and automobile drivers undergoing hospital treatment and severe jail sentences as a result of failure to abide by traffic rules. Most of the floats were entered by business firms.

Copyright, Underwood & Underwood

Floats of Safety Parade That Portrayed Penalties of Careless-ness and Disregard of Traffic Rules by Pedestrians and Drivers

Oil Refinery on Wheels Cuts Costs and Is Easily Moved

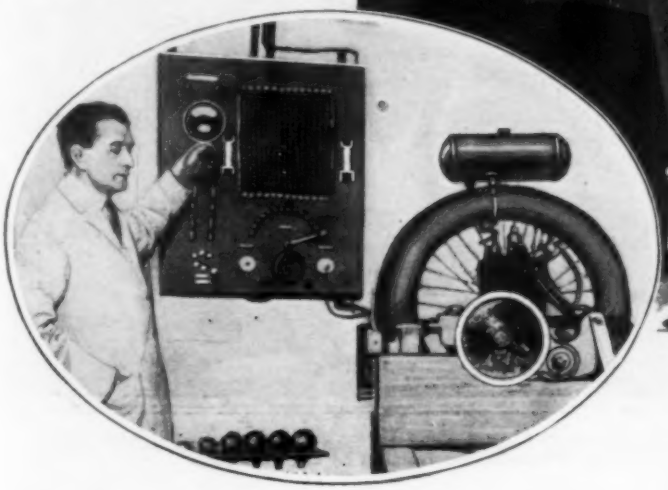
Increased efficiency and a saving in operating and building expenses are claimed for a portable oil refinery recently put into use in Texas. The equipment is carried on two specially built steel railway cars, being permanently attached to and operated from them. The process of moving consists simply in dismantling the detachable equipment, such as pipe connections, smokestack and rectifying tower, placing that apparatus in regular freight cars and consigning the plant to its new destination. The refinery can be placed in operation within eight or ten days after the arrival of the cars, while only four or five days are required to prepare it for shipment again. One of the most revolutionary features of the plant is said to be the process used in condensing vapors. Air instead of water cools the condenser, being drawn through the space between the coils by a suction fan, seventy inches in diameter. Air also reduces the fuel oil into a fine spray for the burners and for combustion. A seventy-horsepower oil engine drives the generator that furnishes the current for the pumps and lighting system, the use of steam being entirely eliminated. The refinery has a capacity ranging from 1,000 to 3,500 barrels of crude oil each twenty-four hours, depending upon the percentage of distilled product in the raw material. Before the plant is placed in operation, the cars are jacked up and lowered on concrete foundation beams which are laid across the tracks.

"Death Ray" Is Carried by Shafts of Light

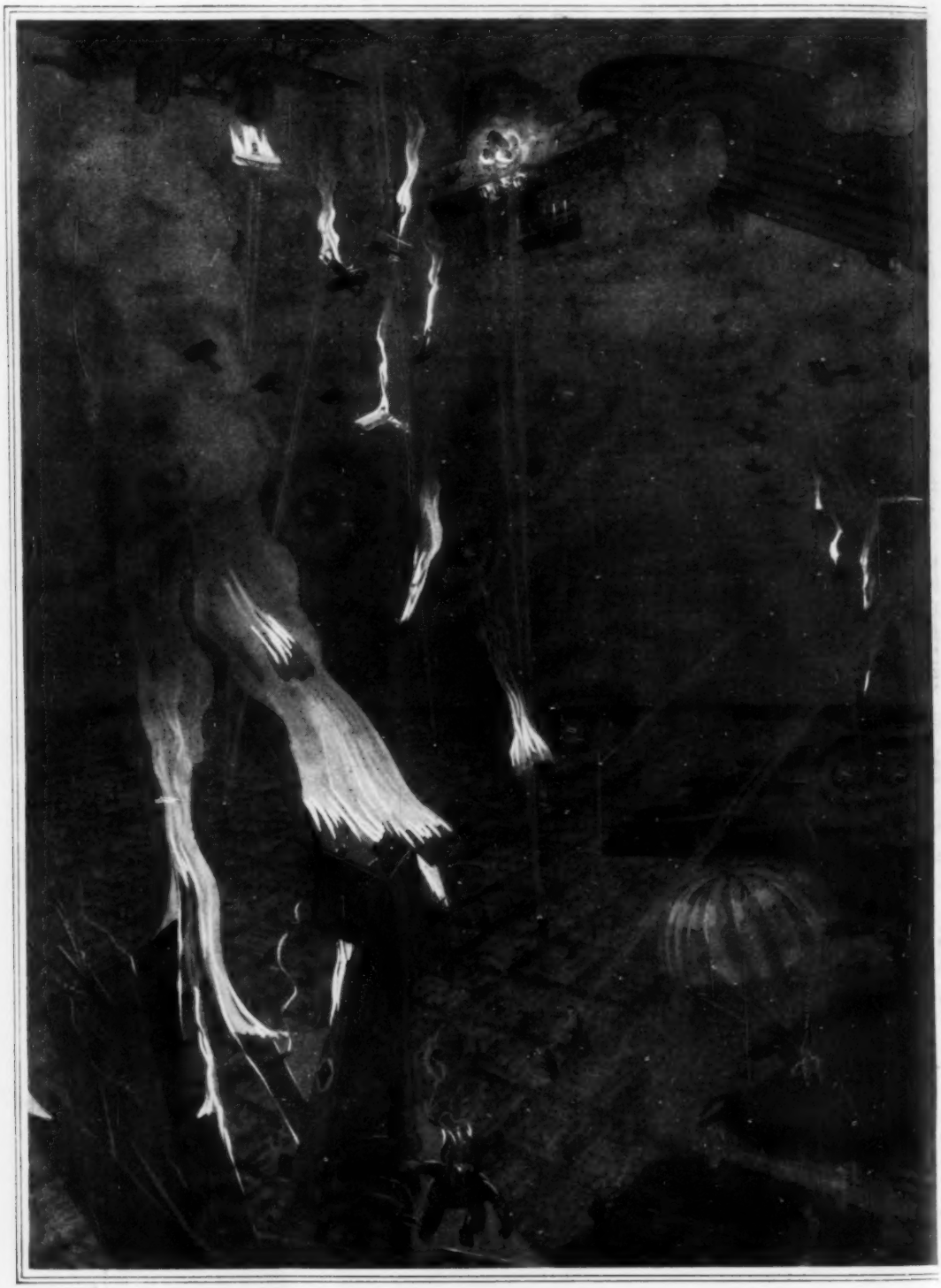
Beam Is Said to Act as Cable for Transmitting Powerful Energy to Bring Down Enemy Aircraft

ACTING as a carrier for energy made up of high-tension electric currents, a new ray invented by H. Grindell-Matthews of London, is claimed to practically destroy aircraft on which it might be directed. The beams, similar to shafts of light, are claimed to render the air they include within their limits highly conductive to electricity.

Tests have been reported where the ray has been used to stop the operation of automobiles by arresting the action of the magnetos, and a quantity of gunpowder is said to have been exploded by playing the beams on it from a distance of thirty-six feet. It is pointed out that the discovery may result in the development of entirely new fields and methods of warfare. Where aerial attacks are to be combated, the rays could be guided from a battery of transmitters on the ground and a barrage of high voltages loosed upon the craft in a fraction of the time necessary to bring a series of guns to bear on the targets. With the ability to control the ray and make it visible or invisible, a property which it is said the inventor has developed, the "spotting" of a target would be greatly simplified. Where attendants have crossed the path of the ray during tests, they have been rendered unconscious by violent shocks.



How Batteries of the "Death Ray" Might Destroy Enemy Airplanes by Passing Electric Energy into Them through Shafts of Powerful Light; Below, Mr. Grindell-Matthews, Inventor of the Ray, Using It to Stop a Motorcycle Engine in His Laboratory



Artist's Conception of Aerial Attack on New York Being Repelled by "Salvos" of "Death Rays" Directed on Enemy Craft from Batteries of Transmitters Installed on High Buildings

Should the Power of the Ray Be Multiplied to Convey Sufficient Destructive Energy to Its Targets, Future Wars May Find Air Fleets Combated by Barrages of Deadly Light Beams

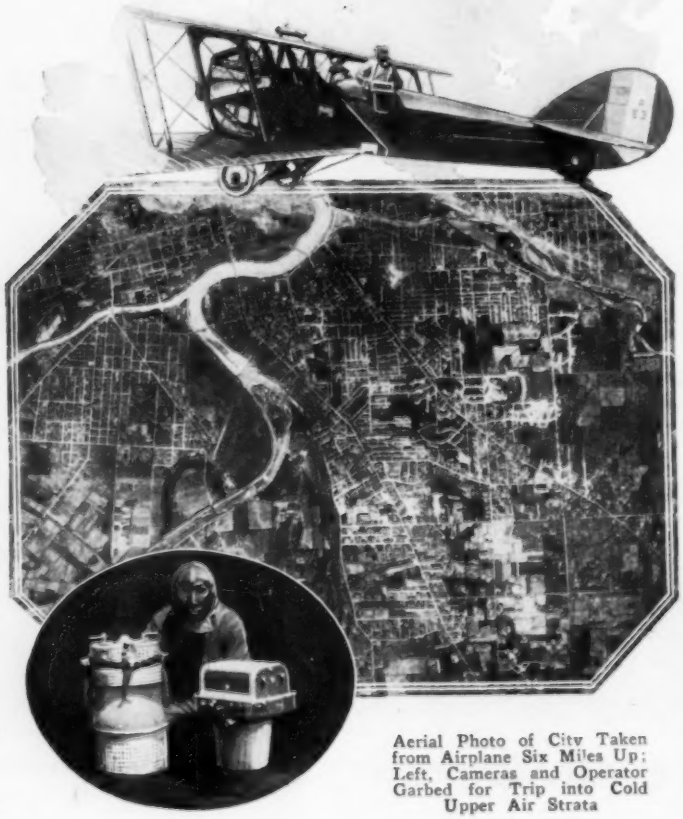
Other cases are reported where intense burns were received on occasions when the workers came into contact with it. Experimental sending stations have been equipped with special protective and safety devices in order to guard against injury to those called upon to operate the transmitting mechanism during the trials.

Throughout its development and testing stages the utmost secrecy was observed by the inventor to conceal the method of generating and directing the rays. Other engineers and scientists claim that similar discoveries have been made in the past in several different countries with electric energy that can be directed along invisible paths, and the "death ray" has been made the subject of court action by those disputing the inventor's right to dispose of it.

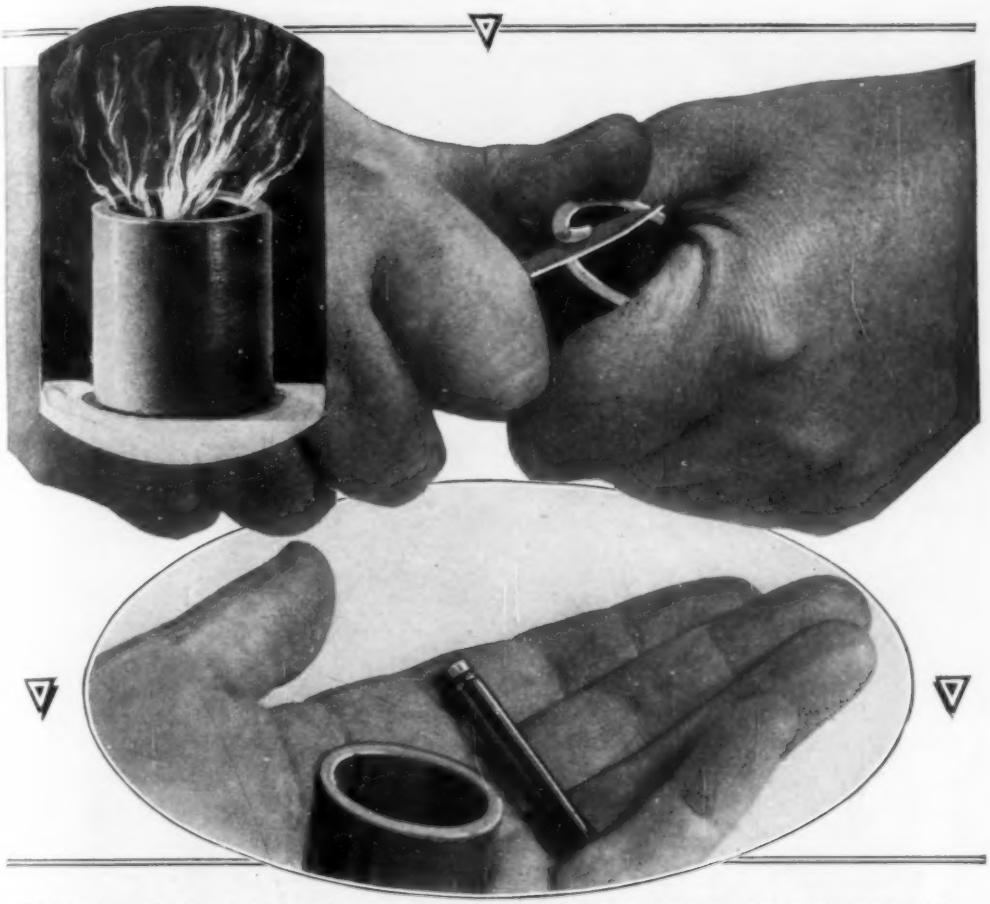
Invisible Plane Photographs City from Six-Mile Altitude

What is declared to be a new record in aerial photography was made when Lieuts. John A. Macready and A. W. Stevens of McCook field succeeded in taking pictures of Dayton, Ohio, from an airplane at a height approximately six miles above the city. The ability to take pictures at high altitudes has long been the aim of aviators, but difficulties in the way of lens and airplanes that could carry a heavy camera and an operator besides the pilot have been many. It was only the lessons taught by many tests that enabled the flight at 31,540 feet with the required weight to be made. A new supercharger was used to increase the engine power, and the aviators covered their faces with grease to prevent sunburn. The sun burns with pitiless intensity in the rarefied air and some protection against the rays is necessary. The camera lens also had to be protected with a special film to prevent moisture from collecting and obscuring the view. The chief advantage of high-altitude photography lies in the larger territory that can be covered. The usual way of photographing extensive areas is by the "mosaic" process. In photographing a city, for example, as many as one hundred different pictures may be made of the various sections and these are placed together like a puzzle. But at 21,000 feet, only two or three photographs are required to include quite a large city.

Another advantage of high-altitude photography lies in the safety it affords during war. An airplane cannot be seen with the naked eye at 21,000 feet, therefore it is less apt to be shot down from earth. This is important where the fate of nations hangs upon a true knowledge of the enemy's ground such as photography affords.



Aerial Photo of City Taken from Airplane Six Miles Up; Left, Cameras and Operator Garbed for Trip into Cold Upper Air Strata



Oil-Absorbing Bushing Doing Service as a Wick; Chipping Piece of the Unannealed Metal with Ordinary Penknife, and Volume of Lubricant the Porous Tube Will Hold

Metal That Absorbs Oil Like Sponge Is Perfected for Bearings

Imagine a substance so hard that it will turn a lathe tool, and yet so porous that it will soak up oil like a sponge, and you have a fair idea of a brand-new metal that has been perfected in the laboratories of the General Motors corporation and will soon be found in many installations that have heretofore lent themselves only with difficulty to efficient lubrication. In composition it is a copper-tin bronze in which graphite has been incorporated. Thousands of tiny pores, uniformly distributed throughout the structure of the metal, give it the absorptive qualities of a blotter. An interesting demonstration of this characteristic can be made by fitting an ordinary old-fashioned kerosene lamp with a bushing in place of the usual cotton wick. The bushing can be lighted and will burn as long as kerosene remains in the lamp. The quantity of oil the metal will absorb amounts to twenty-five per cent of its own mass, and a peculiar feature is that the oil does not drain out again but is held no matter how dry the surface may be wiped. The metal is designed for bearings in the generators and starting motors of automobiles, in laundry machinery, where the leakage of alkaline water makes lubrication a difficult problem, as well as in installations where thorough lubrication is required on account of heavy loads and high speeds, or both. It is stated that it is practically impossible to gall a shaft running in such a bearing, even though no lubricant is fed to the bearing for a long time.

¶Old leaves are being utilized in France for making paper, fuel and cattle food. They are crushed and chemically treated so that the powdered portion easily separates. The fibrous ribs and veins are then pulped and made ready for use in the manufacture of paper, while the powder is converted into fuel and cattle food.

Dore's Portrayal of the Destructive and Pestilential Plagues Sent Down upon the Egyptian Pharaoh and His People to Compel Them to Free the Israelites from Bondage

Unearthed Ruins Bear Out Bible Stories

Canaanite Pottery and Altar of Worship Found near Dead Sea Point to Civilization of Abraham's Time

BEARING out the Bible stories of the destruction of Sodom and Gomorrah, the wicked "Cities of the Plains," long buried evidence of their existence and fall has been unearthed by an expedition under Dr. Melvin G. Kyle, of Saint Louis, according to reports.

The party found a plain where the Arabs, making excavations in a cemetery, had discovered specimens of elaborately wrought bronze pottery believed to have been made forty centuries before, during the time in which Abraham is supposed to have lived. These relics, together with an ancient structure once used as a place of worship by the tribes of Canaan, which has been uncovered near the shores of the Dead Sea, the explorers say, point to a civilization that, according to Biblical history, existed in that region thousands of years ago.

The sites of the old cities that fell under a rain of fire, as told in the Old Testament, are thought to have been long since buried beneath the waters of the Dead Sea, but the spot on which stood Zoar, the city that gave refuge to Lot when he fled from the doomed towns, is said to have been discovered by members of the searching party. Strata of rock salt, marl and sulphur occupying the district close to the sea, according to the accounts of the expedition, show that at some time in the remote past, a subterranean explosion had taken place, forcing these substances above ground. The ancient cities are supposed to have existed close to this territory and to have been consumed by gases that ignited as they poured from the ground when it burst open. Suggestions have been made that divers be sent down into the Dead Sea to search for ruins.

Patriarch Jacob Delivering His Prayer for Guidance; Reproduced from One of Dore's Masterful Drawings in Which He Depicted Scenes and Incidents Described in the Old Testament

Seek Cure for Cancer by Causing It to Grow in Animals

Scientists who are constantly seeking a cure for the dread malady cancer, have been attempting to find a solution for their problem and to learn more of the nature of the growth by producing it in animal specimens. Experiments with rats and mice have shown that a certain kind of tar will cause cancerous formations six months after it is applied to the living tissue of the animals, and it was also found that cancers were produced in the stomachs of the specimens after they had eaten cockroaches infested with a certain kind of worm. While the cure is being sought, efforts are constantly in progress to improve existing methods of treatment, by radium and other means, to allay the ravages of the mysterious affliction.

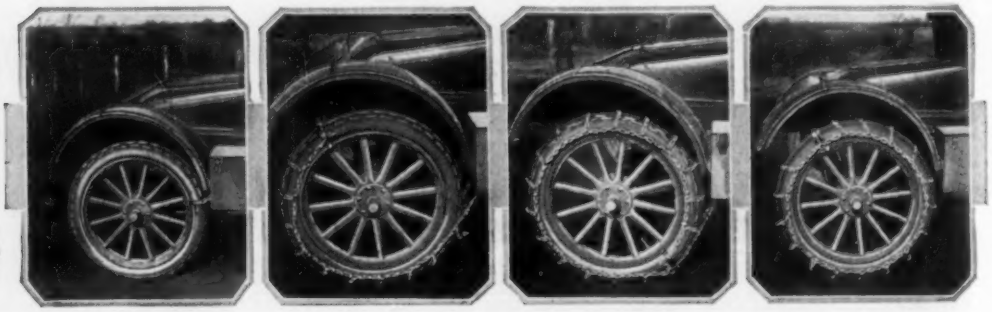
Dr. M. B. Krumbhaar of Philadelphia General Hospital Who Is Seeking Cure for Cancer

Typing Is Taught by Phonograph Lessons Set to Music

Typewriting is being taught and the speed of writing increased by lessons set to music embodied in twelve phonograph records that have recently been placed on the market. The music, it is claimed, prevents the student from following the slow pace he may set for himself, by forcing him to work faster. Each record starts out with a few words of instruction, and then at the words "Ready; Go!" a stirring march begins. The beats are especially accentuated so as to be heard above the noise of the typing with the idea that a key is to be struck at each beat. The range of the records increases gradually from fourteen words a minute in the first lesson to 103 in the twelfth. Two of the advantages claimed for the method are that the music relieves the lessons of their monotony and that the student's speed is unconsciously accelerated.

CHAINS ARE PUT ON AUTO WITHOUT LEAVING CAR

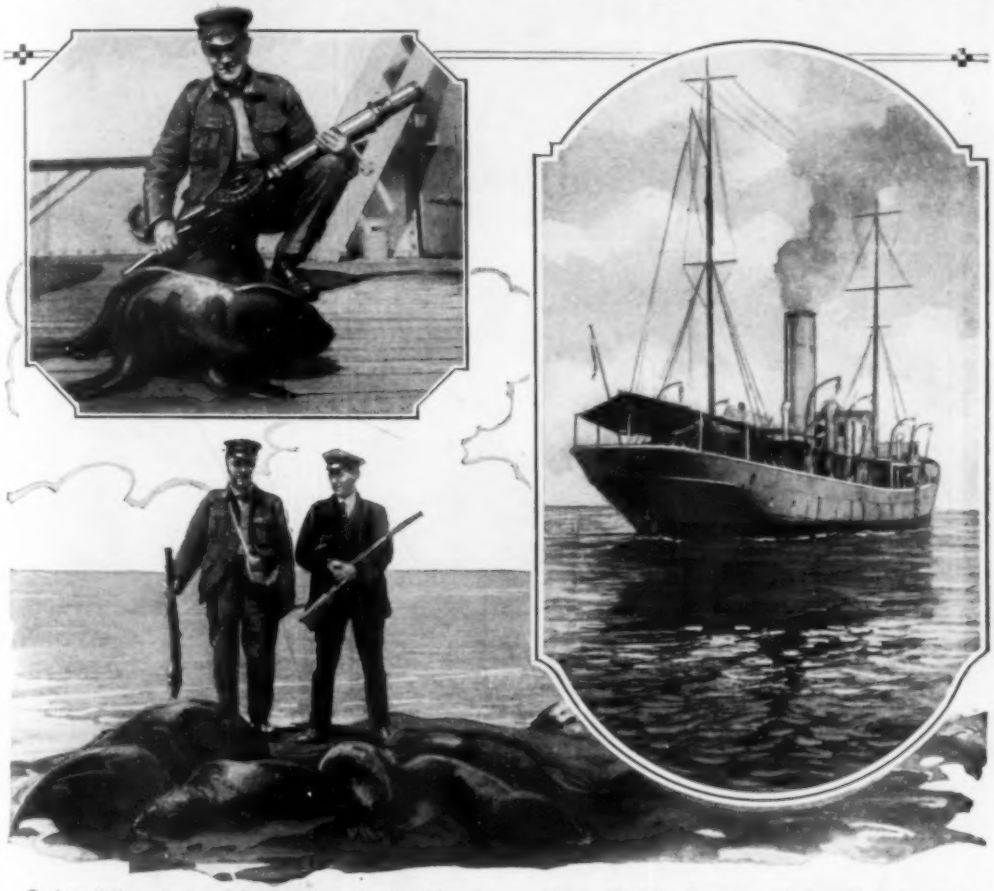
To enable tire chains to be placed on the rear wheels of an automobile by a driver while seated in his car, a spring-reel device has been patented. The links are wound in two boxes on the running boards. Near the driver's hand is a small lever with which clamps attached to the chains are engaged with the tires. As the car is run slowly forward, the chains are wound tightly to the tires and locked in place by another spring clamp that snaps the ends together. A smaller chain, used to hold the tire chain taut while it is being put on, is released automatically when the operation is completed and is rewound when the spring in the reel recoils.



Views of Rear Wheel While Chain Is Being Put On as Car Proceeds. Clamped to Tire (left) It Unwinds from Box and Automatically Locks in Place

Sea Lions Shot with Machine Guns to Preserve Edible Fish

Hunters armed with machine guns, rifles and pistols were dispatched by the Canadian government not long ago to attack the sea lions that annually devour large numbers of edible fish off the northern coast of British Columbia. After a two-days' hunt through dangerous and almost uncharted waters in the cruiser "Givenchy," 1,884 of the animals were killed. Following investigations in 1913 and 1915–16, the government decided to keep the number of sea lions in check, but not to exterminate them, as they are an enemy of the vicious dogfish. They are hunted by native fishermen for their hides and oil.



Cruiser "Givenchy" and Scenes from the Sea-Lion Hunt; Above, Machine Gunner with Pup Kept for Pet; Below, Two of Crew and Part of Kill

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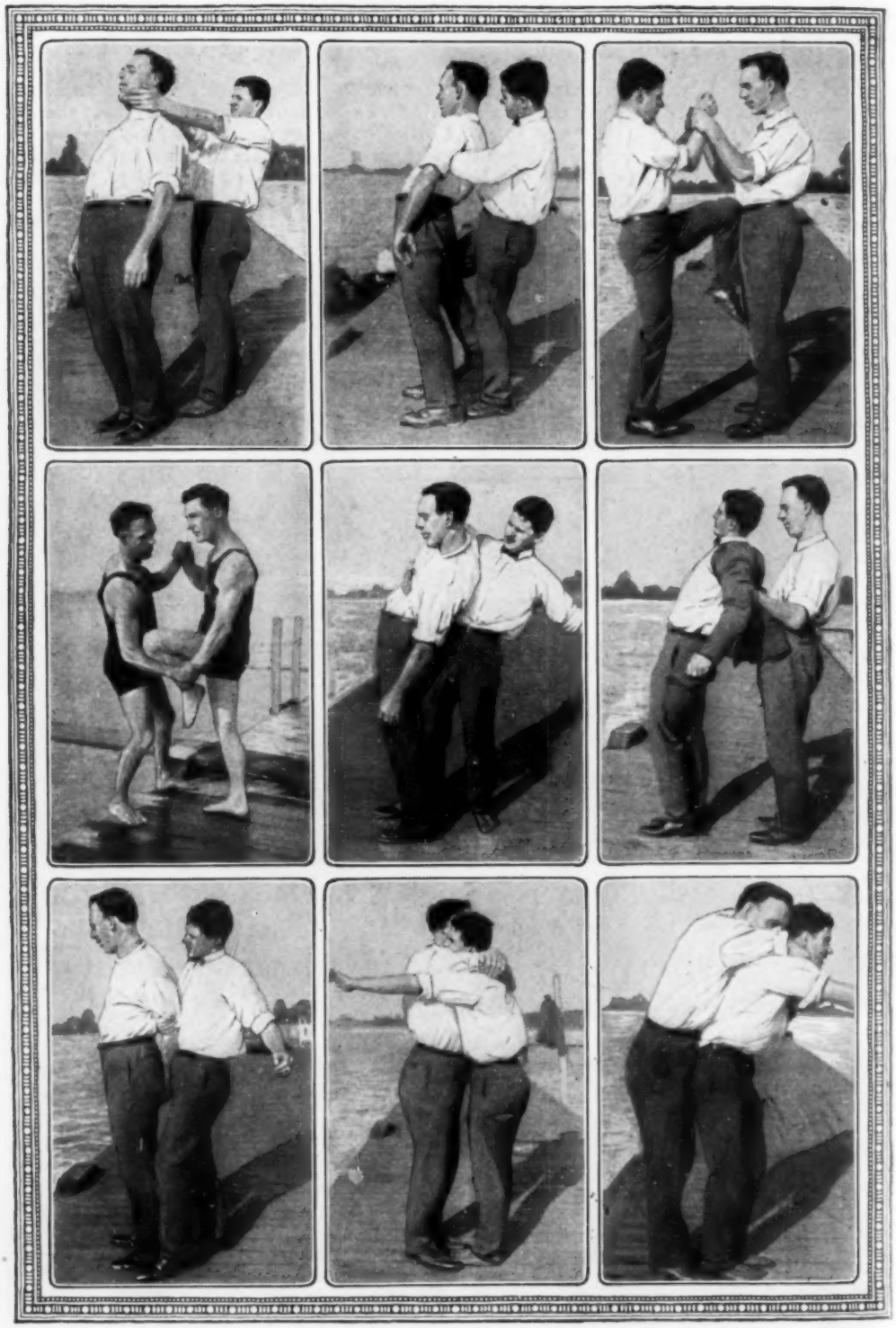
Nearly three times the size of California, a sheet of ice covers most of the country of Greenland.

Sunshine May Be Made Fatal to Man by Use of Chemical

That the human body may be so sensitized by certain substances that even a brief exposure to ordinary sunshine is dangerous or fatal is the claim of a German chemist, Herman von Tappeiner. In testing a certain coal-tar dyestuff, called acridine, he dropped a small amount of it into water containing some small organisms, which immediately died when exposed to light, although they were unharmed if left in the dark. After experimenting on animals, another substance was injected into the arm of a physician. He felt no ill effects while in the shade, but when he exposed himself to sunlight, was quickly overcome. As a result of these tests, the belief was expressed that it was possible to sensitize a human being to sunlight just as a photographic plate is so sensitized that even red light will fog it.



Illustrations of Positions and Grips by Which Life-Saver Can Rescue Drowning Person and Avoid Dangerous Holds of Victim That Often Lead to Disaster for Both

Better Holds and Grips Aid Rescue of Persons Near Drowning

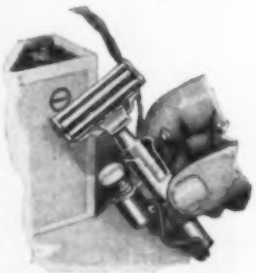
Improved ways of saving endangered bathers result each year from the activities of life guards at beaches and summer resorts. Better grips and holds have been worked out so that the rescuer may be able to swim more freely and safely, and more efficient methods of starting natural respiration and ridding the lungs of water also have been devised. With a cool head and application of tactics depicted in the illustrations, many emergencies can be met successfully and lives saved. Getting a tight hold and escaping the victim's often fatal clutch are the first essentials, and to do this, it is advisable, if possible, to approach from the rear, swimming under water a short distance if necessary. Holds can often be broken by bringing the knee up sharply and pushing the drowning person away. Even if the rescuer should be grasped from the front or from behind, if his "wind" is not shut off and his hands are free, he will sometimes be able to tow the victim for a short distance. Rolling on barrels to free the lungs of water is considered a loss of time. Resuscitation should be attempted at once by turning the subject's head to one side and placing it on one of the arms. In the illustrations on the opposite page, beginning at the upper left-hand corner and reading across, the first shows a good hold for a tow if the rescuer can swim on his back. Subject is lifted to a horizontal towing position as shown in next picture. The following two illustrate methods of breaking a hold if clutched by the victim. A towing hold with hip under the victim and use of a side stroke is next shown, followed by an example of the "coat towing hold" useful in many emergencies. Picture seven gives a grip that leaves one arm free for swimming, the next depicts how rescuer can swim even if grasped from the front and the last, if clutched from behind, both valuable for short distances.

Roll Seven-Foot Ball across Nation in Drive for Camp Recruits

When citizens' military training camps open August 1, scores of "rookies" will probably ascribe their presence there partly to the seven-foot push ball, weighing 350 pounds, that was rolled from Chicago to New York and Washington and then across the country to enlist recruits. Started on its unique journey March 15, the huge red, white and blue sphere of waterproof leather, lumbered through towns and cities before the vigorous shoves of recruiting officers who walked behind it. Whenever a halt was called, the advantages and plans of the training camps were explained to the crowds that gathered around the ball, and applications for enlistment were received. It bounded into New York City in time for the opening baseball games and was then rolled down to Washington, where General Pershing officially "welcomed" it. Officers declared that the ball was one of the most effective enlistment devices ever used.

Giving Huge Push Ball a "Lift" on Its Cross-Country Journey for Recruits for Citizens' Military Training Camps

Shaving in the Dark Is Made Easy by Electric Light on Razor



As an aid to shaving where other light is not available, a small electric lamp for attaching to the handle of a safety razor has been devised. Fastened to a clamp it can be easily fixed in position with a thumbscrew. The bulb throws its rays directly on the path of the blade, permitting the user to readily guide the razor. Connected to a small battery, the light is of advantage to campers and tourists.

Portable Tobacco Store Carried on Back of Its Owner

Shaped like a cigarette and constructed so that it can be rolled up and carried home on the back of the proprietor when the day's business is done, a unique street-booth for the sale of tobaccos has made its appearance in Berlin. The distinctive shape of the little shop advertised its wares and its portable feature enabled the owner to move whenever trade slackened in any one locality. Interior space was sufficient for the clerk and a fair-sized stock. Painted canvas on a collapsible frame was the material used in the construction of the booth.

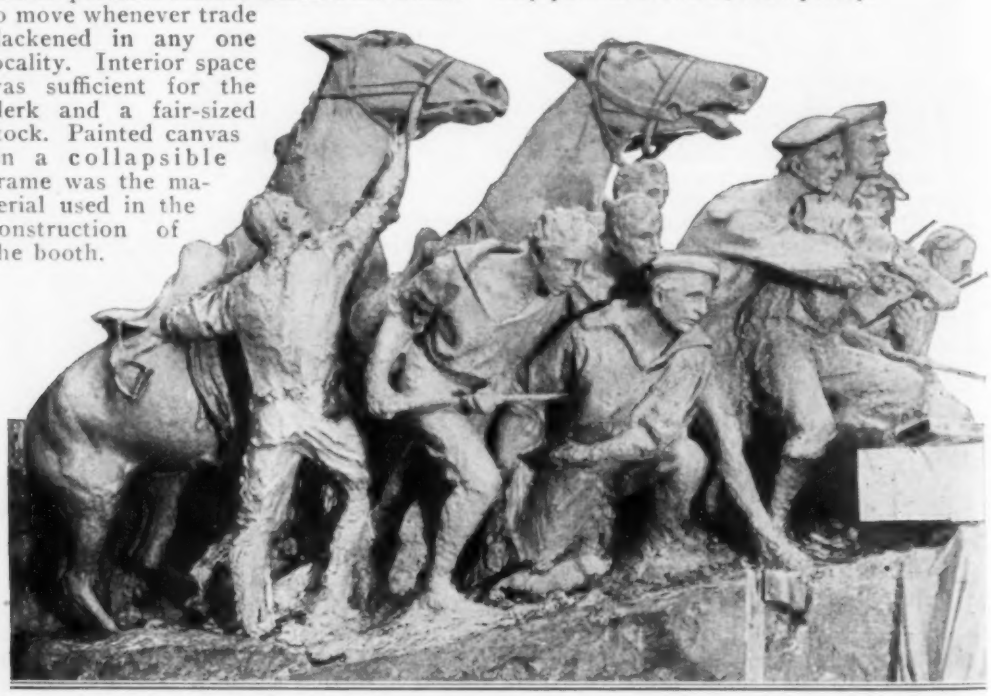
Shopping at Tiny Cigarette Store that Proprietor Takes Home When Day Is Done

Grape Seeds and Skins Converted into Oil and Stock Feed

Seeds and skins of grapes left over in making wine, are being used in France to make stock feed and lubricating oil. Mixed with the silage of wine residue, cakes are formed which are fed to cattle with profitable results. The oil, extracted from the seeds by crushing them, is said to be a satisfactory substitute for castor oil in the lubrication of high-speed internal-combustion engines.

Great War Memorial Figures Are Eight Feet in Height

Plaster casts for what is said to be one of the largest bronze war memorials in the United States have been completed by Gutzon Borglum, the sculptor, at his studio in Stamford, Conn. The group will include forty-four figures, each eight feet high, depicting battle scenes from the revolutionary, civil and world conflicts—"the three wars of preservation," according to the sculptor. In style and massiveness, it will suggest the huge Confederate group which Mr. Borglum is chiseling on the face of Stone Mountain, near Atlanta, Ga. The memorial will be placed in Military park at Newark, New Jersey.



Model Cast of a Battle Group for Gigantic Bronze Memorial Which Will Contain Forty-Four Figures and Will Depict Scenes from Revolutionary, Civil and World Wars

One Method by Which Movie Directors and Cameramen Keep Characters in Speeding Autos Always in Full View of Audiences When Pictures Are Shown on the Screen

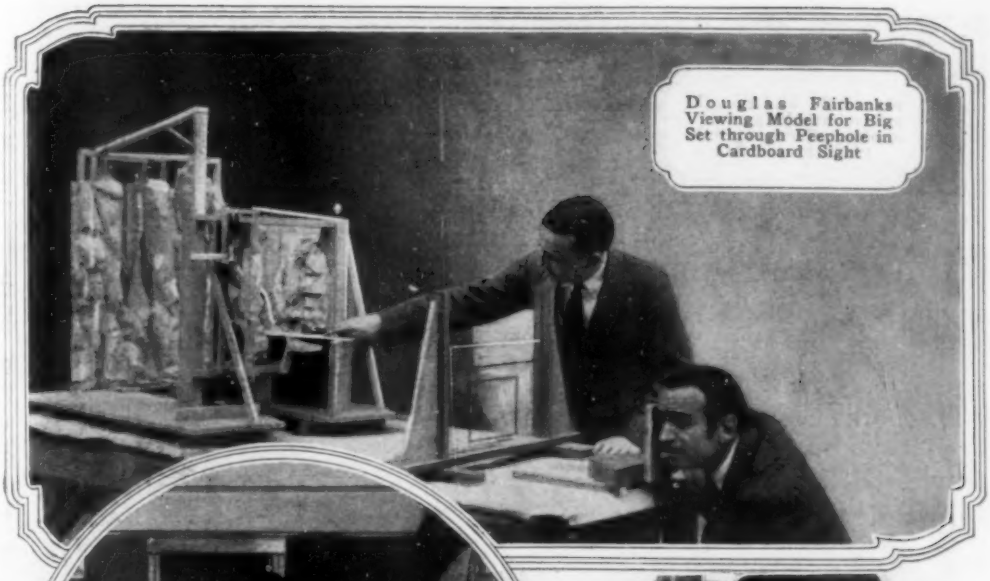
Skill of Movie Engineers Rivals Reality

Disasters of Sea and Land Produced with Pocket-Size Settings While Spectacular "Props" Touch Almost Every Industry

TURNING bare plains and barren wastes of sandy ground into large communities of majestically arched buildings crowned with graceful domes and lofty spires, or changing hillsides and mountain tops to terraced splendors that recall the gorgeousness of the old Orient, movie engineers vying with reality in producing impressive settings for motion-picture spectacles, draw upon practically every art and trade in the performance of stupendous tasks they complete almost overnight. Whether portraying serious drama, the most farcical comedy or enacting some great tragic story of history, appropriate backgrounds are faithfully copied from old paintings or descriptive writings or worked up from detailed models by skilled artisans, who often possess the combined talents of architect, photographer, actor, and director. Drawing on workshops that cover acres of land, the "hot-dog" engineer, as he is known in and about the studios, directs the erection of huge structures on the "lot" or supervises the construction of miniature scenes in his laboratory with a mathematical perfection that insures a perfect "stage" to the performers who enact the plays. In producing great disasters on sea and land for the movies, the engineer avoids the dangers and expenses of actually staging such scenes with life-size material by resorting to the employment of toy-sized objects and landscapes. Some of the most realistic marine catastrophes seen on the screen are the result of carefully placed cameras and tiny vessels propelled across small tanks of agitated water. Close atten-

Sunlight Arc Lamps Used to Illuminate Large Interior Sets Where Many People Are Congregated

In Imitating the Old-Time Spanish Galleons That Once Plied the Seas, Propelled by Slaves Chained to Rowing Benches, This Strange Craft Was Reconstructed from a Cast-Off Sailing Ship by Engineers Who Spared No Effort to Fit the Vessel into a Romantic Spectacle of the Silent Drama



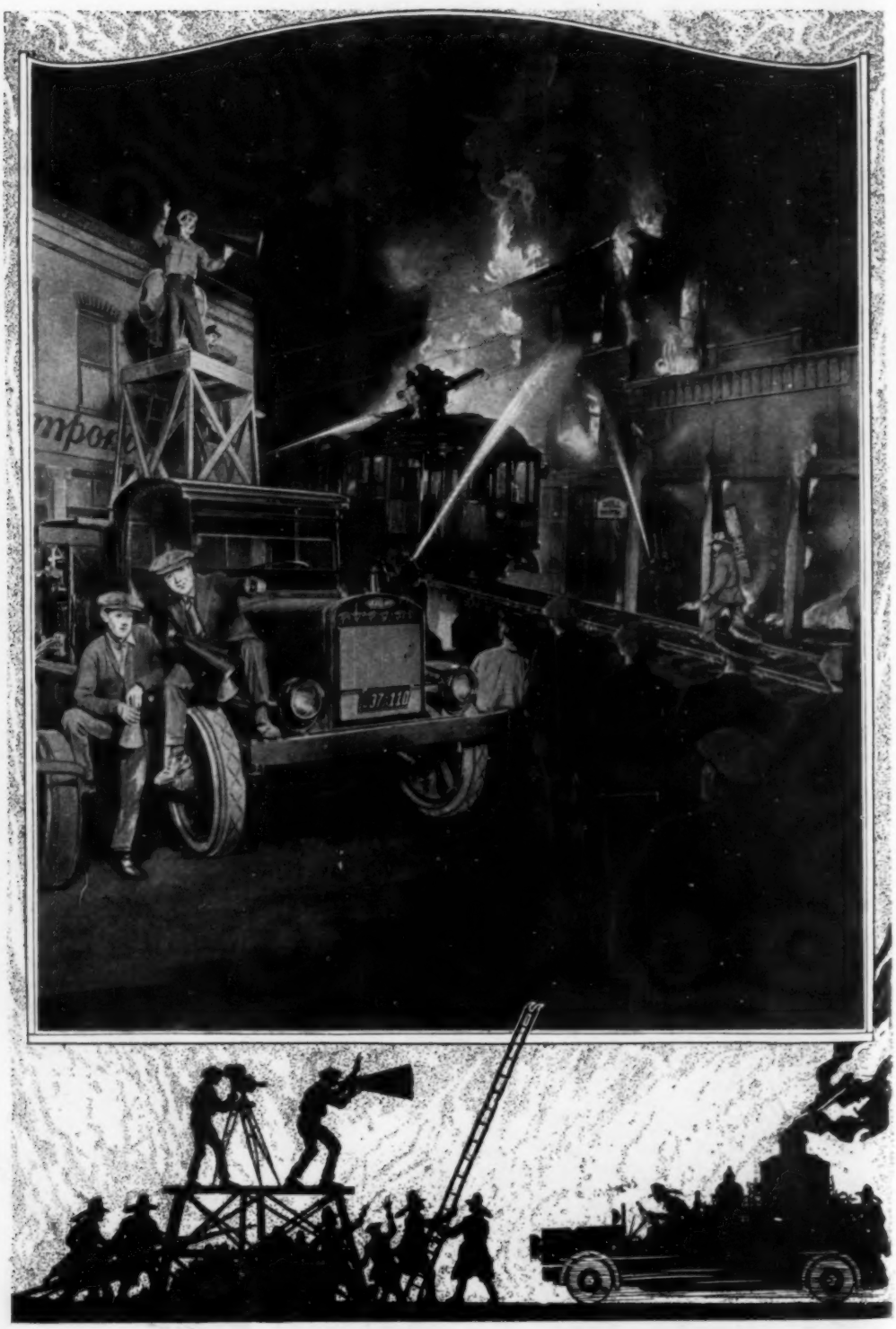
Douglas Fairbanks Viewing Model for Big Set through Peephole in Cardboard Sight

Educating Child Movie Actors in Hollywood Schoolroom
© U. & U.

Artist Painting Atmospheric Background in Front of Which Subtitles for Big Motion-Picture Feature Will Appear When Reels Are Shown on Screen

Picture Designed Solely for Wall Decoration of Interior Colonial-Mansion Setting

In Imitating the Old-Time Spanish Galleons That Once Plied the Seas, Propelled by Slaves Chained to Rowing Benches, This Strange Craft Was Reconstructed from a Cast-Off Sailing Ship by Engineers Who Spared No Effort to Fit the Vessel into a Romantic Spectacle of the Silent Drama



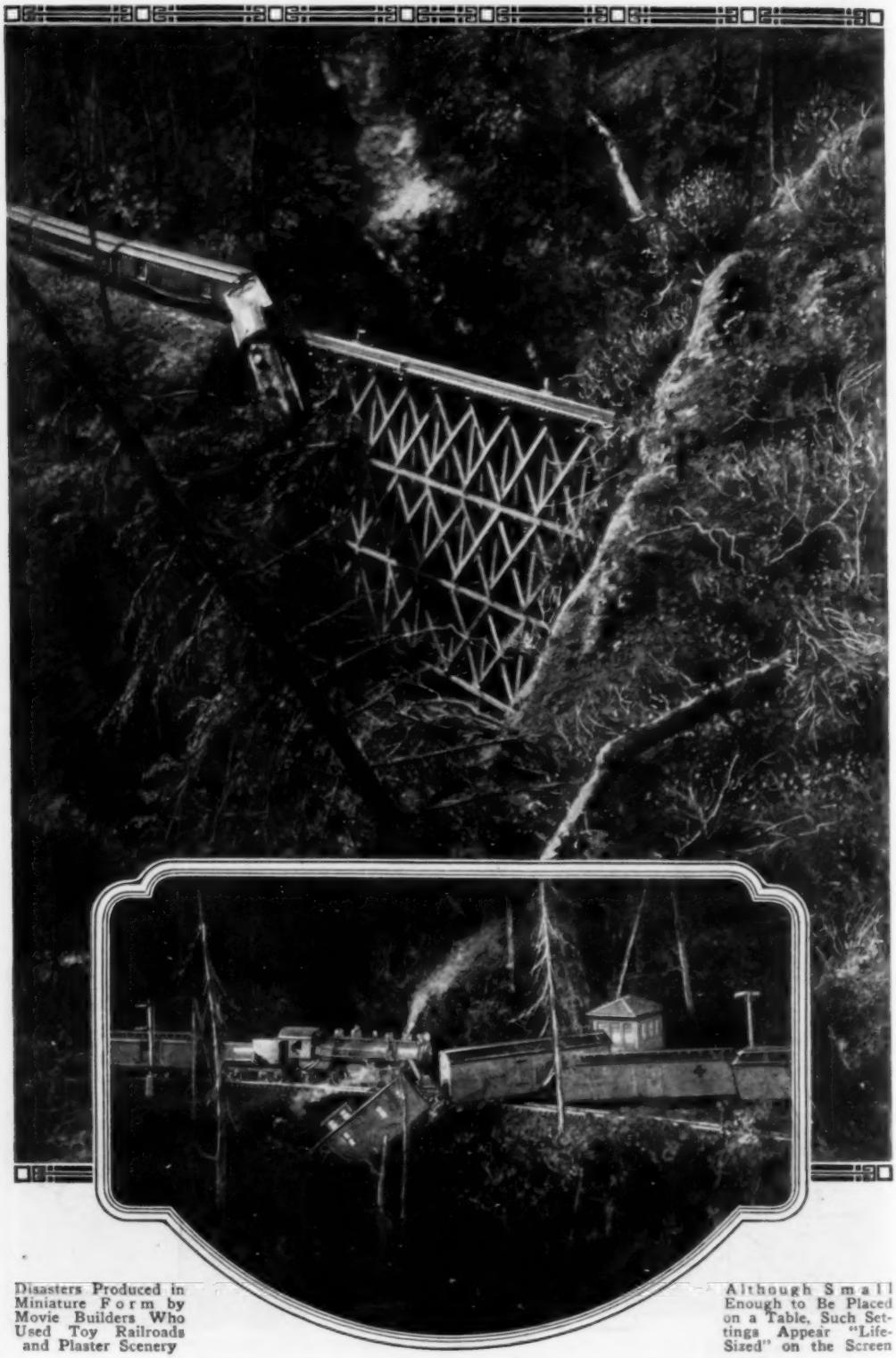
Enactment of Fire Scenes for the Movies Requires Close Attention to Every Detail of Realism; the Properties Are Designed to Prevent Their Burning Too Rapidly for the Camera's Purpose

Modeled from a Picture of the Original, This Old-Time Railway Train Is Run by a Hidden "Gas" Engine

Actors Posing amid the Debris of Crashed Airplane Arranged by the Movie Builders; Left, How Studio Aircraft Is Put Safely through Wild Maneuvers

Auto Wreck Staged in Property Car by Actors Who First Rehearse the Scene

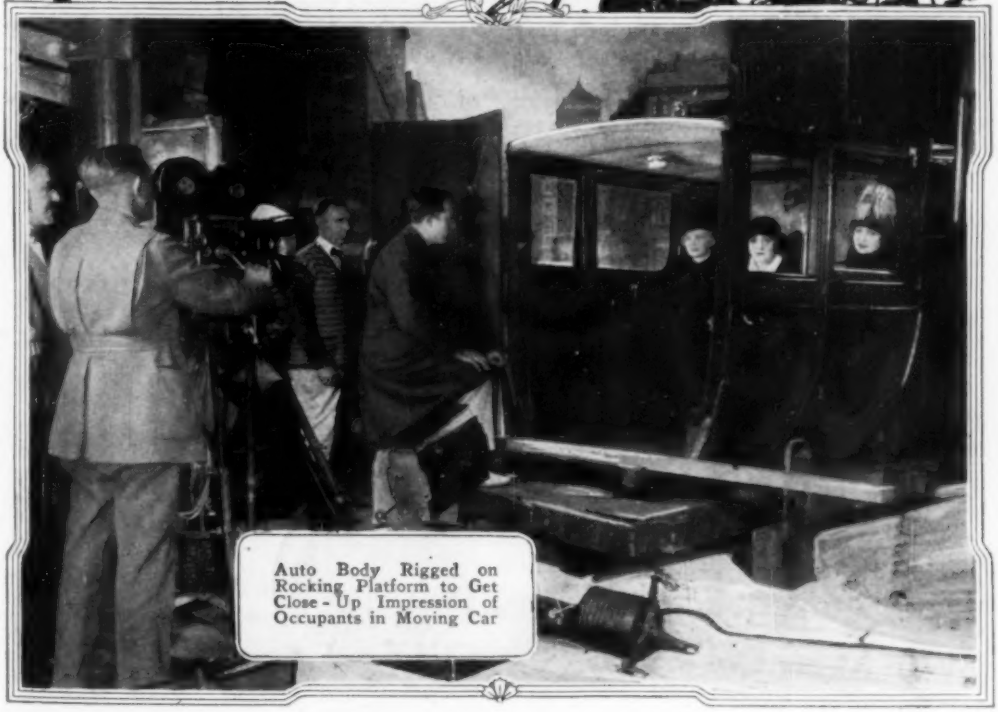
Comedian Swinging from Trolley of Street Car Going Thirty-Five Miles an Hour



Disasters Produced in Miniature Form by Movie Builders Who Used Toy Railroads and Plaster Scenery

Although Small Enough to Be Placed on a Table, Such Settings Appear "Life-Sized" on the Screen

All Ready for a Subway Act; How Movie Folks Imitate Familiar Scenes of Everyday Life in Public Conveyances



Auto Body Rigged on Rocking Platform to Get Close-Up Impression of Occupants in Moving Car

tion is paid to every detail of the action in order to imitate as nearly as possible the characteristic roll of ships and the heavy swells of the sea. The camera used for these scenes is of a special rapid type that takes five pictures to the one of ordinary machines. Usually but a few days' time is allowed the movie builder to produce some needed "trick" property or mechanical arrangement by which screen illusions are to be carried out. And in addition to his knowledge of architecture, mechanics and art of almost every period of the world's history, the hot-dog engineer is called upon for information dealing with styles of clothing, domestic customs, military ethics and even social manners, of bygone centuries.

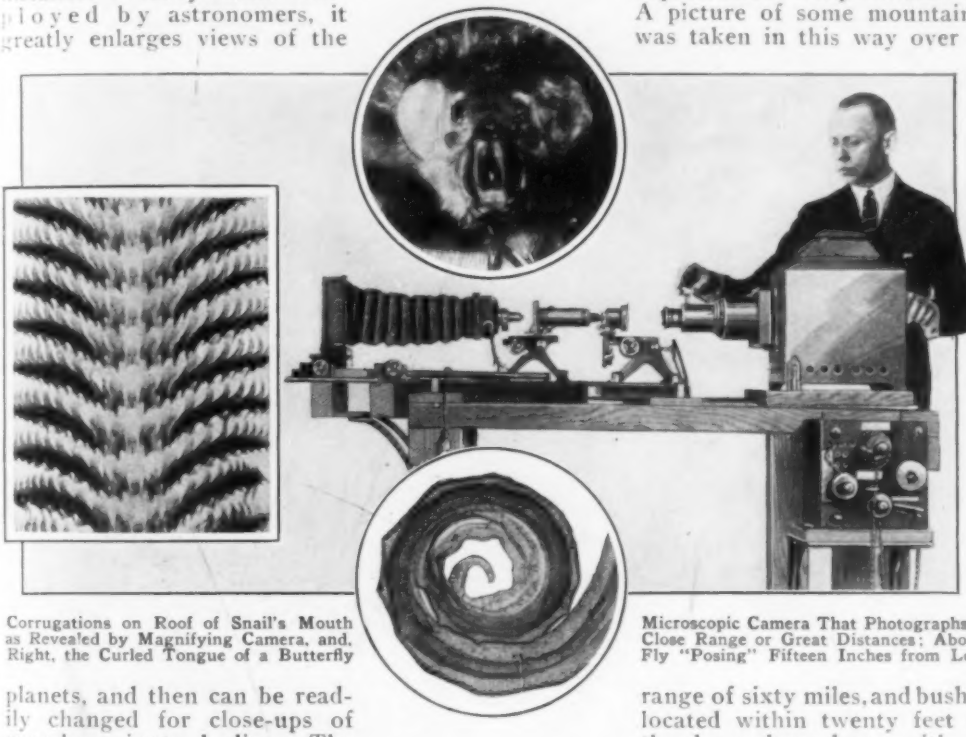
Constructing Huge Plaster Head of Egyptian Statue, Part of Background of Historical Motion-Picture Production

Where locations for scenes are selected at great distances from the studios, it is often necessary that the engineer and his staff transport large amounts of properties to the places, sometimes employing two or three lengthy railroad trains, resembling the modern caravan of a big circus. If the field of action covers a wide expanse of ground, a telephone system is required to connect the various directors and their assistants with important stations scattered over the area to govern the proper sequence of the performance. For this purpose complete portable electrical equipment is included in the properties when current cannot be secured from commercial power plants. Much so-called trick photography is often resorted to in constructing the sensational and hazardous-looking performances frequently seen carried on high over crowded streets in the screen thrillers. This is made possible by erecting faked parts on the roofs of buildings and setting the camera at fixed positions for taking the pictures. When a dam is planned to burst and cause great volumes of water to sweep away railroad bridges, houses and log jams, vivid productions can be arranged by the artisans with miniature landscape models, using dolls moved by hidden strings to represent people being overtaken by the rush of "mighty waters" that are poured into the beds of tiny streams

Helping Movie Fans to Follow Every Play of Comedy Actors by Trailing Them with Camera Mounted on Wheeled Platform

From Insects to Stars Is Range of Combined Micro-Telescope

By mounting a telescope in front of a magnifying instrument, an apparatus has been devised in England, that can be used to study objects within a few inches or at distances of many miles. Employed by astronomers, it greatly enlarges views of the planets, and then can be readily changed for close-ups of near-by minute bodies. The implement, it is said, is also of advantage in reading thermometers at great distances or for watching the melting of substances in furnaces which are too hot to be approached. No larger than the ordinary microscope, the instrument causes the subjects to appear in relief, instead of giving them a "flat" look when seen through the lens. Glasses for both near and far observations can be attached to the device, which also may be connected with a camera when photographs of the objects under study are desired. A picture of some mountains was taken in this way over a range of sixty miles, and bushes located within twenty feet of the lens showed up with as much detail and as clearly as did the distant point on which the instrument was trained. It is claimed that magnifications above 5,000 are possible, and that they can be altered without optical change.



Corrugations on Roof of Snail's Mouth as Revealed by Magnifying Camera, and, Right, the Curled Tongue of a Butterfly

Microscopic Camera That Photographs at Close Range or Great Distances; Above, Fly "Posing" Fifteen Inches from Lens

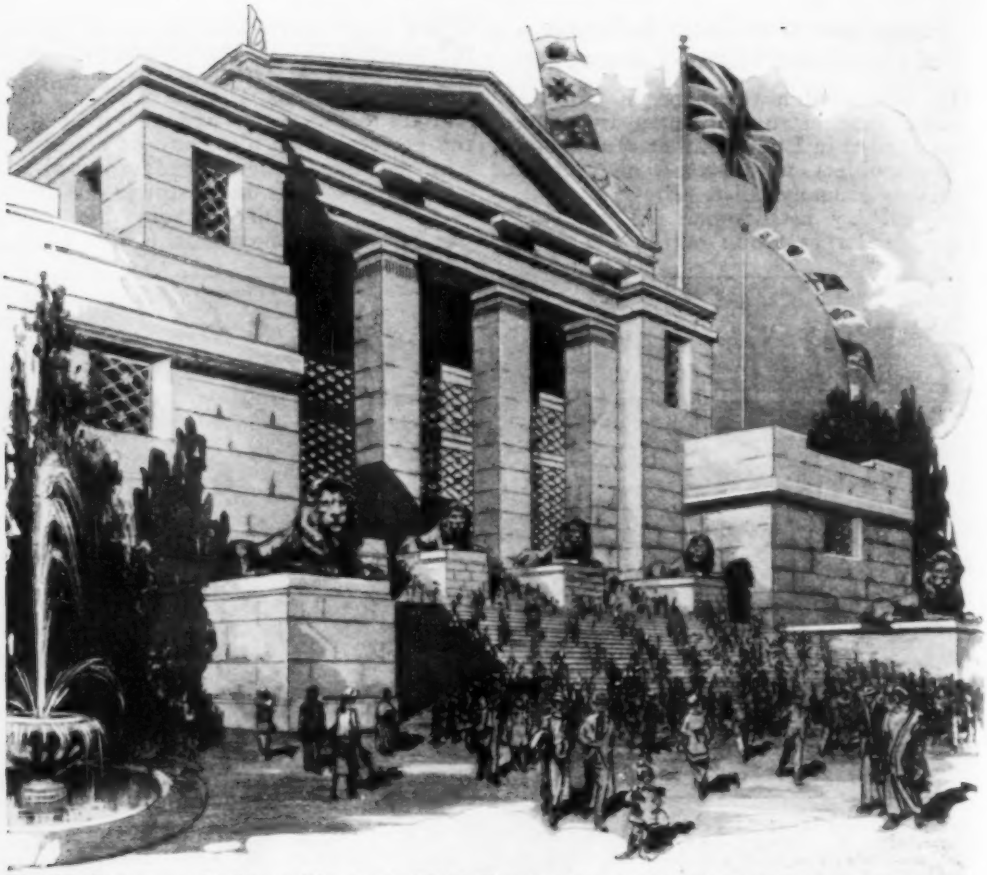
Even Old Teeth Find Market

To reclaim the silver used in rivets that hold sets of false teeth together, shopkeepers on the East Side of New York City buy cast-off "plates" from the owners. It is said that a considerable amount of the metal is thus purchased by the dealers at low cost. After the silver is extracted, it is melted into a solid nugget.

Safety Spark Gun for Lighting Gas Eliminates Danger of Matches

For lighting gas, a safe and simple igniter that shoots a shower of hot sparks over the burner when a spring trigger is snapped, has been invented. Friction of a notched wheel against a bit of stone material produces the sparks. The lighter is operated easily with one hand, is long enough to keep the fingers away from the blaze and requires no care except to renew the sparking stone occasionally.

Pressing Igniter Trigger with Thumb Sends Spark Shower into Gas from Notched Wheel



British Government Pavilion at Wembley in Which Historical Naval and Military Episodes Are Reproduced on a Changeable Water and Platform Stage Operated by a Novel Mechanical Arrangement

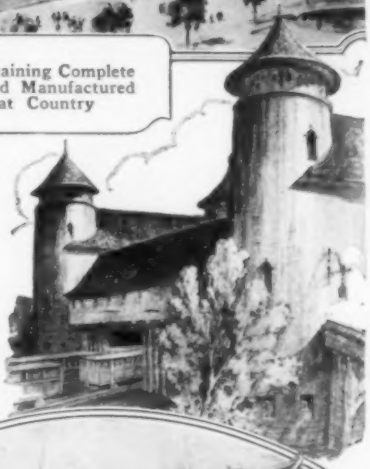
Arts of Empire Shown in British Exposition

Products of Industry, Architecture and Domestic Life of Overseas Provinces Collected in Trade Exhibition of Motherland

BRINGING together exhibits of the products of art and industry from every part of the British empire, the exposition at Wembley park, in the London area, occupies 216 acres and is conveniently reached by practically every railroad in England. A half dozen special stations adjoining the grounds receive passengers from approximately 1,500 street cars and 3,000 motor busses each day.

Circling the grounds is a non-stop railroad with trains that travel twenty-four miles an hour, slowing down at loading platforms to a speed equal to a walking pace, so passengers can alight from or board the coaches without need of bringing the cars to a dead halt. Within the area, the total length of the roads on which the various spectacles front is estimated at fifteen miles. On some of these avenues, motor coaches and electric cars are operated to carry visitors between the more prominent points. Embracing almost every known form of architecture—both ancient and modern—the buildings, most of which are constructed of concrete, represent the greater part of the $60,000,000 spent to erect the gigantic displays. Practically the entire affair is planned on the ground level, with the exception of a realistic copy of a coal mine, made of clay, with subterranean workings that total more than a quarter mile in length. Colonies of dark-skinned peoples transplanted from

Canada Building Containing Complete Range of Natural and Manufactured Products of That Country



Right, "Old London Bridge," Replica of Famous Old Span; Left, Burma's Fretted Pavilion

Pillared Facade of Gorgeous Ceylon Building

Hongkong Building Displaying Wonders of the Orient

Red Front of Nigerian Inclosure Where African Arts Are Shown

Courtesy The Sphere

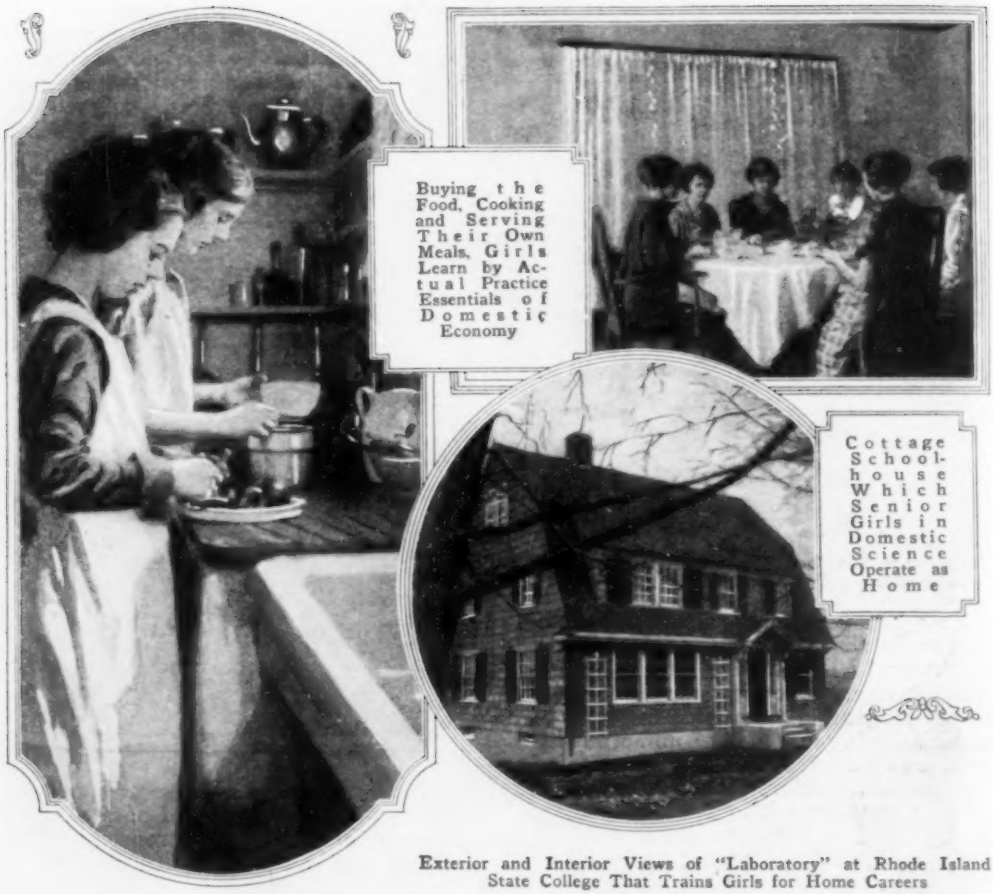
Arranging Models of Vessels around Docks of Miniature Seaport for Display at Wembley, and Replica of Giant Crane; Below, "Bird's-Eye" View of Toy Harbor and Workman Touching Up Merchant Fleet

their native lands in the tropics may be seen living in villages built by themselves within the grounds, and indulging in pastimes and rude industries, indifferent to the swirling thousands of visitors who daily attend the exposition. Oriental countries are represented by small communities of their peoples housed in quaint artistic homes their own workmen planned and erected for the purpose. With each native unit, the things they make for trade and home are shown in neatly arranged displays, while those who produce the articles ply their crafts in full view of the observer. During the period of the exposition, meetings of commercial, architectural, scientific and engineering leaders from all over the empire will be held, to study and discuss various subjects touching the industrial and domestic advancement of the provinces. In the Palace of Engineering, claimed to be one of the largest concrete structures ever erected, instructive and interesting collections of

Trade Apprentices Competing in Plastering, Plumbing and Bricklaying Contests at Wembley Exposition

the most modern achievements are set in vast series that mark the progress of the mechanical world. Near by, the Industrial Palace, covering about thirteen acres of ground, contains displays of manufacturing methods of numerous industries that affect the everyday life of modern civilization. Estimates of the number of visitors who will attend the gigantic fair in the six months it will be in progress have been placed at 25,000,000. Many of these, it has been pointed out, will be attracted not only by the trades exhibitions but by the novel amusements, pastimes and important sporting events which have been designed for lighter entertainment of the guests. Among the more prominent displays are many miniature groups. Gorgeous palaces, great industrial establishments and miles of busy seaport areas have been artistically reproduced by skilled craftsmen with toylike models.

British Empire Exposition as Seen from an Airplane, Showing the Artistic Ground Plan and the Monster Stadium in Which Various Performances and Spectacular Contests Are Held


Buying the Food, Cooking and Serving Their Own Meals, Girls Learn by Actual Practice Essentials of Domestic Economy
Cottage Schoolhouse Which Senior Girls in Domestic Science Operate as Home

Exterior and Interior Views of "Laboratory" at Rhode Island State College That Trains Girls for Home Careers

Girls Are Taught to Manage Homes by Going to School in Cottage

To teach young women the science of home management, Rhode Island state college has erected a completely equipped cottage where girls in the senior classes live for part of the year and handle all its affairs. Under the direction of instructors, they plan their own meals, do all the marketing, cooking, dishwashing and housework, keep the books and even do their own washing if they desire. Practical training, gained in this way, is expected to prove a valuable supplement to laboratory work and enable the girl to decide more easily if she desires a home career.

Deadly War Gas Now Being Turned into Peace-Time Ornaments

French chemists have succeeded in turning one of the deadly gases developed during the war into umbrella handles, cigaret holders, paperweights and all sorts of ornaments. These objects are beautifully yellow, as transparent as amber, harder than ebonite and nonconductors of electricity. The same chemists also have evolved sweet perfumes from ill-smelling acetylene, and another liquid from the same source has the property of preventing the oxygen in the air from combining with oils and turning them rancid.

Ants Honeycomb Pillars of Church

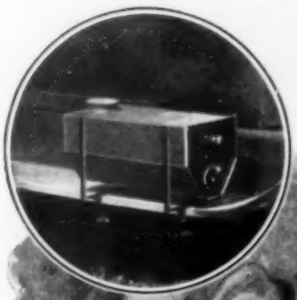
Ants boring into the wooden supports, joists and flooring of a church in southern Illinois, did damage estimated at nearly $25,000. The falling of a fragment of a rafter during a service revealed the fact that the lower part of the building, and even some of the pews, had been honeycombed by the insects. It was necessary to replace the wooden pillars with iron ones and to make other extensive repairs before the building was pronounced safe again for service.

Gypsy Life in Autos Lures Tourist Hosts

Good Roads and Convenient Camp Equipment Lead Millions of Motorists to "Rough It" in Nation's Great Outdoors

AS evidence that the outdoor sport of automobile camping is growing by leaps and bounds, it is estimated more than 5,000,000 people toured the country with their cars last year and that a great increase over that number will be found this season to have "hit the rubber trail" to resorts and camp grounds.

Invading the most remote wilds of the forest lands and traversing the barest wastes of sand that cover many parts of the west, the motor tourists stream over the continent, crossing the paths first used by pioneer settlers and roads that were the nation's only highways of travel long before the days of steamboats and railroads. Tents are snugly packed on the outsides of the cars and entire families speed into quiet, open country where temporary canvas homes are set up in a short time. From convenient chests and boxes strapped to running boards, cooking utensils, folding chairs, tables and small stoves are taken. In a few minutes, with these accessories of outdoor life, the open-air home is in full swing, sleeping quarters are arranged, and after an overnight stop, the travelers pack their equipment again and are away for another jaunt on their gypsy journey. Refinements in motor-vehicle construction, laying of improved roads and the establishment of thousands of automobile-provision stations throughout the country are combining to make this a nation of outdoor enthusiasts. The value of the pastime to the health of the people alone is said to be beyond any attempt to estimate. Woods, fishing streams, lake resorts and national parks, are all receiving

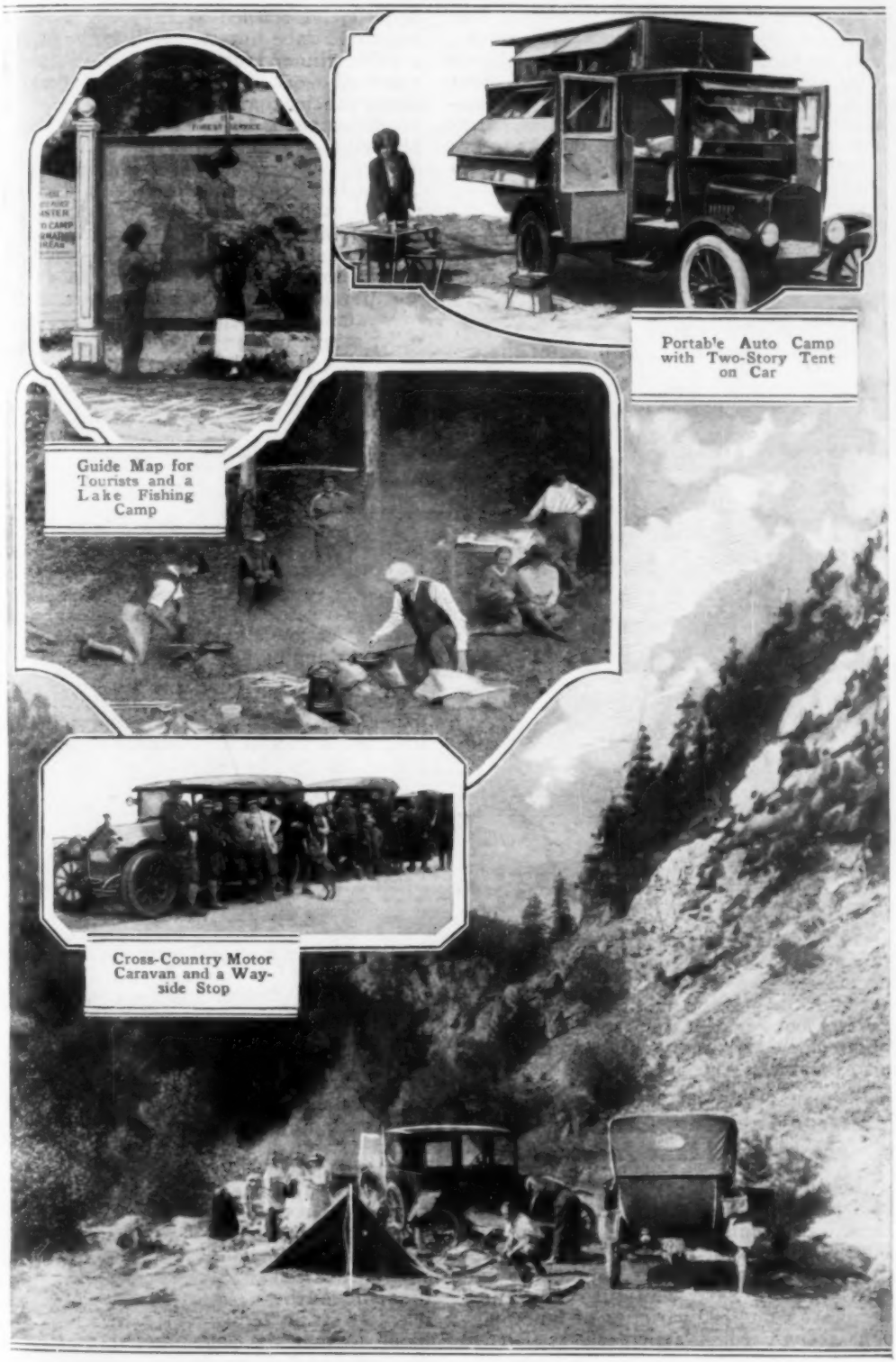


Mealtime at the Roadside; the Auto Tourists Set Up a Kitchen with Stove and Utensils That Fit in One Package

Tourist Group Washing Up at Municipal Camp in California; Left, around Campfire in National Forest

Orchestra Pavilion in Tent Colony of Outdoor Fans

"Hikers" Who Motor to Woods for Tramping and Community of "Auto Gypsies" in Camp



Portable Auto Camp with Two-Story Tent on Car

Guide Map for Tourists and a Lake Fishing Camp

Cross-Country Motor Caravan and a Way-side Stop

thousands of these gypsy tourists. The average sojourn lasts about two weeks, and to care for the great army of those who are out to "rough it," national, state and even municipal and village governments have erected camping sites, summer hotels and information stations to accommodate the throngs of "gasoline wanderers."

One-Man Jazz Band Gives Effects of Fourteen Instruments

Shaped like a guitar with double sets of strings, an instrument with which it is claimed that one man can produce the effect of a fourteen-piece orchestra has been invented. Various horn, cymbal and flute attachments are provided within easy reach of the player's hands and lips so that several combinations of sounds may be obtained at the same time. Solo parts can also be played if desired.

Inventor Playing Odd Guitar That Has Horns, Cymbal and Flutes for Orchestral Effects

Pigeon Breeding, Centuries Old, Hobby of Many Americans

Centuries old, pigeon breeding today is said to be the hobby of a million Americans. Beginning with the humble, wild blue rock dove in the days of the Egyptian and Roman empires, inbreeding and crossbreeding have continued until now there are some 300 varieties of fancy pigeons recognized. Particularly responsive to experiments, these birds are being improved and trained as carefully as thoroughbred race horses. It is claimed that a prize winner is more often the result of years of work on the part of some far-seeing fancier than an accidental discovery. So important is heredity accounted that a blue-ribbon bird will bring hundreds of dollars or even a thousand or more. Throughout the centuries, the pigeon has proved to be a steadily increasing factor in the military operations of nations. The development and training of the reliable, sturdy homing pigeon with its keen eyes and powerful wings is now a part of the programs of many countries, for use when other means of communication fail. Built on racing lines, the homer is trained by slow stages to fly unswervingly to a given point from great distances.

Waterwheel on Floating Raft Rises or Falls with the River

Because continual changes in the level of the Orange river in South Africa interrupts the operation of ordinary waterwheels, a device has been invented that rests on a raft. Whether the stream is in flood or at low stage, the wheel is always kept working by being at the proper depth in the current. The invention, which protrudes through the center of the float, is expected to achieve great savings in the irrigated agricultural districts, where extreme changes in the river's height often stop the operation of fixed pumping machinery and interfere with the steady flow of water to arid land.

Steel Ink Eraser Shaped Like Spoon Fits in Any Penholder

Resembling an ordinary steel pen, a spoon-shaped ink eraser designed to be attached to any holder has been introduced by a European manufacturer. It has ground and hardened edges for scraping out the marks, and when inserted until only the rounded section projects, but slight pressure is required to remove the ink. It is not likely to tear the paper and is especially adapted for making erasures on tracings.

Buildings in the Form of Plants Express "Spiritual Science"

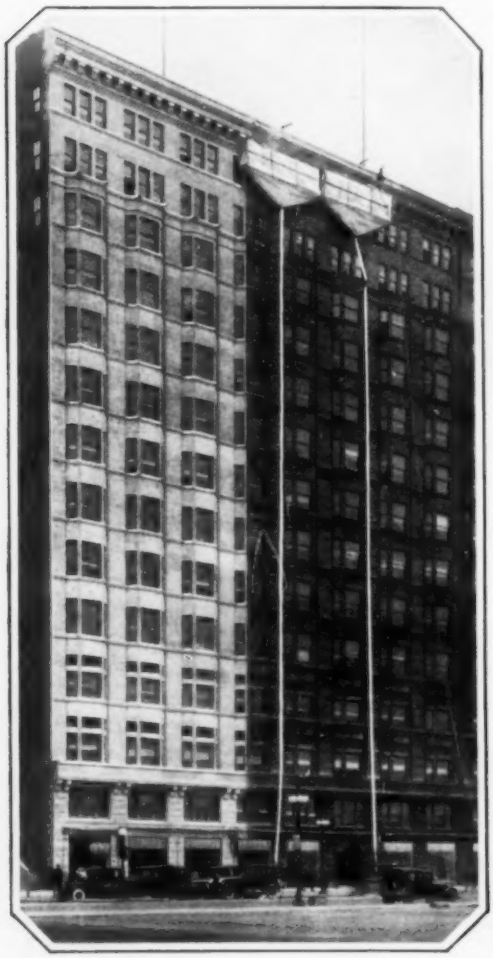
Striving to express the teachings of spiritual science in buildings, a group of scholars in the little town of Dornach, Switzerland, has erected a number of structures of weird and fantastic design, achieving what critics call a new movement in architecture. Plants and growing things furnish the motifs not alone for the decorations but for the forms and shapes of the buildings and rooms as well. Consequently, they have a power house with a tall smokestack with "buds" on it like a gigantic pussy willow; a main building with a bulbous roof similar to the contour of a plump mushroom, and other structures of odd design. There is little attempt at symmetry. Simplicity and bulk, in mass and detail, are apparent. Windows are usually of one pane of thick, colored glass, so arranged that various combinations of tones are caused when the light shines through them. The rooms are built in the form of plants and leaves, so far as possible, and are decorated on walls and columns with curious wood carvings and with futuristic paintings. The school, originated by Dr. Rudolf Steiner, also propounds theories in other arts, and in music and drama.

Interior and Exterior Views of Weird Buildings Patterned after Plants and Leaves That Members of a Swiss School Have Erected to Express Teachings in "Spiritual Science"

¶Popular Mechanics Magazine does not publish the name of maker or seller of any device described in its pages, but this information is kept on file and will be furnished free by addressing our Bureau of Information.

Ton of Soot Washed from the Face of Hotel by Sand Blasts

Washing the faces of city skyscrapers to remove accumulations of soot and dirt is a task that costs thousands of dollars each year and requires the services of many workmen. To clean the tile front of a single large building in Chicago last spring with an acid solution cost $2,000, and considerably more was spent in scouring another with sand blast. The workers, wearing special suits and goggles to protect themselves, with the aid of two large sand-blasting machines, dug more than a ton of dirt from the structure, leaving the stone in its native color, almost pure white. The task was done on tightly covered scaffolds, and refuse and sand were filtered to the street in long canvas tubes connected to aprons below, so that none of the material would fall on pedestrians.



Magic Worked by Sand on Screened Scaffolds; Scoured and Unscoured Sections of Chicago Hotel

Eighty Billion Dollars Is Latest Estimate of World-War Cost

Eighty billion six hundred and eighty million dollars is given as the cost of the great war in figures compiled by a New York banking concern. This sum, it is pointed out, would reproduce all of the railway mileage in the world with more than twenty billion dollars left. To give an idea of the huge sum by comparisons, the report declares that the cost of running the United States government from 1791 through the year 1913, was $24,500,000,000. And this amount includes the expenses of fighting England in 1812, Mexico in the '40's, the Civil war, several Indian campaigns and the Spanish-American war. In 1914 economists estimated the wealth of the people of Great Britain to be about $70,000,000,000. This figure included property of every kind in England, Wales, Scotland and Ireland, factories, the great navy, coal, tin and iron mines, the shipping industry, in short, all tangible property.

Electric Light in Walking Stick Is Hidden under Band

By turning the ferrule of a walking stick in which a flashlamp is concealed, the bulb may be exposed and lighted ready for use. The device is helpful in dark theaters, to disclose a keyhole at night or to read small print where other illumination is not sufficient. It is also convenient in reading the dial of a watch in the darkness and eliminates the necessity of fumbling in pockets for matches or other means of lighting. When not required, the globe can be protected from injury by sliding the metal guard, which serves as an ornament to the cane, over the opening.

¶Weighing 1,168 tons, there is an obelisk in Egypt which has never been raised.

Rich and Poor Find Joy in Work with Hands

DEVOTING their leisure hours to practical work of the hands in making everything from toys to useful instruments and models of machinery and big boats, many men occupying high positions in professional and business life vie with toilers in factory and field in pursuit of interesting hobbies. Between innings of baseball games "Frankie" Frisch of the New York Giants worked on the model of a toy he had invented. A prominent official of a large eastern city has for years turned his spare time to the carving and assembling of violins which he sells cheaply or gives away to his friends. Only recently he learned to play the violin, although his three children are finished performers on the instrument.

Some of the best boat models made are those created by prominent men who pursue the art as a pastime and have become skillful wielders of carving utensils simply through their own efforts in applying a love of tools to the performance of useful

Professional Baseball Players Tinkering with New Toy between Innings, and Son of Frank A. Vanderlip in His Home Workshop

Amateur Woodworker and a Specimen of Elaborate Geometrical Chip Carving He Made in Spare Time

tasks. Franklin D. Roosevelt, former assistant secretary of the navy, specializes in building miniature sailing boats. Beginning with making toy craft for his children, interest in the work brought adeptness in the handling of tools and material and gradually expertness and originality. From a pastime the hobby with the modeler became a study and now, according to Mr. Roosevelt, he designs various types of sailboats for the sake of experimenting with weights, sail form, speed and other features.

Many members of the highest courts in the land, railroad presidents and bankers in all parts of the country are known to have home workshops where they spend the time away from business grind in doing light lathe work, woodturning, cabinetmaking and the like. The son of a nationally known multi-millionaire of a midwestern city spends a great portion of his time in tearing down old automobiles, which he buys, in attempts to discover their weaknesses or defects. However, the "riding" of hobbies requiring work with the hands is not confined solely to those who practice callings of totally opposite characters. Toilers in shops and mills derive much enjoyment in doing on

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Franklin D. Roosevelt, Former Assistant Secretary of Navy, and Model of a Fleet Naval Vessel

their little home workbenches the same kind of things at which they are employed every workday of the year, and many adepts at furniture making not only provide tasty articles for their own dwellings, but dispose of their pastime products to dealers who eagerly pay high prices to obtain original and durable designs.

In St. Louis a millionaire lumberman has become a master of geometrical chip carving, using mahogany, oak, walnut and other hardwoods to obtain artistic creations which are looked upon by the neighborhood as an exhibit worth study.

Change in Construction of Violin Results in Better Tone

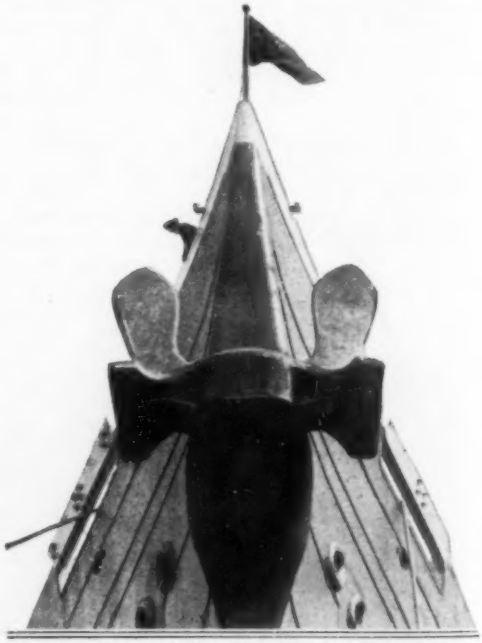
By following a slightly different principle of construction, an Austrian is reported to have designed a violin with tones that are said to rival in volume, strength and quality those produced by the almost priceless instruments of the old masters. According to the inventor, the body has been made to resound to its full capacity by connecting one of the feet of the bridge with the belly and carrying the other through on a pier which rests on the back. In this way, both sides are brought into vibration, and the air inclosed in the resounding chamber is animated. This is said to cause a better tone in every way.

Earth Is the Target for Stones of Many Varieties from Sky

Varying from tiny particles to huge masses weighing tons, more than 20,000,000 meteorites according to the estimates of astronomers, are drawn into the earth's atmosphere every twenty-four hours. Rarely, however, does one reach the ground, as they are burned up by friction as they rush through the air. In 1492, a meteorite weighing 260 pounds fell in Alsace; one, the shape of a man's head and weighing fifty-four pounds, fell in Provence, France, in 1637, and in 1654, a small one struck and killed a man at Milan, Italy. One of the largest recorded in recent times fell in 1917 at Perth, Scotland. It weighed thirty-eight pounds. The British Museum now contains more than 500 specimens of meteorites and over 300 of them have actually been seen to fall. Masses of iron, believed to be of meteoric origin and weighing several tons have been found in Greenland and in Mexico.

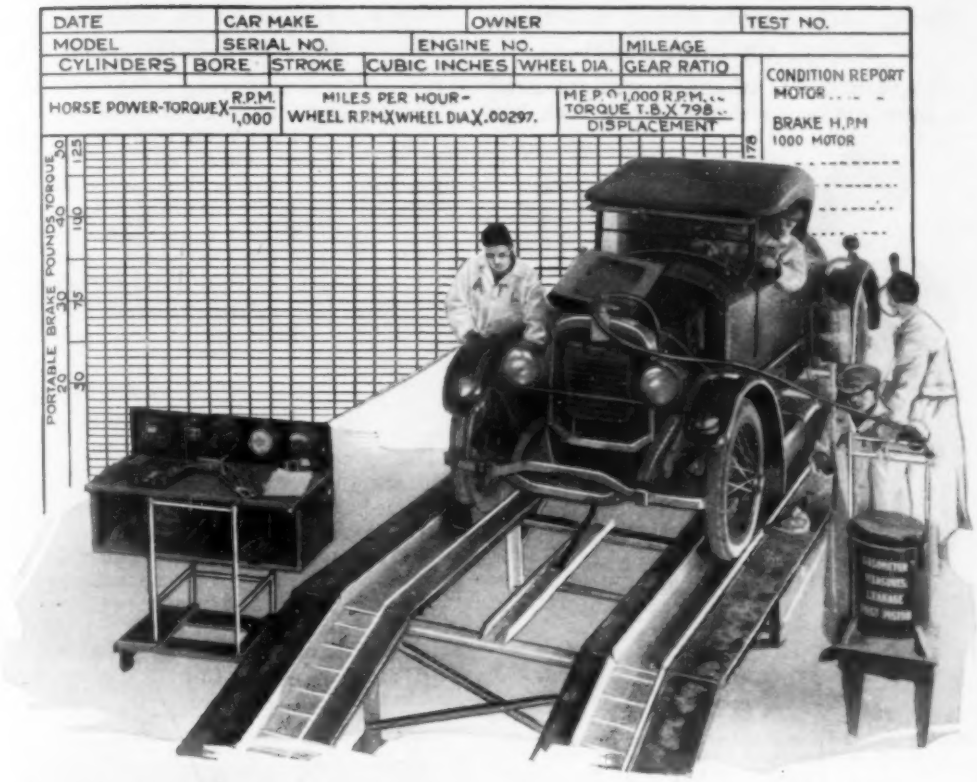
Giant "Nose" of Liner Is Repaired after Accident in Harbor

After repairs necessitated by having run aground last fall, the "Leviathan," pride of the American merchant marine, has returned to service. Six feet shorter than



Narrow "Nose" of the "Leviathan" and One of the Gigantic, Pronged Anchors

the "Majestic" and with only 700 tons less displacement, the gigantic liner, before she was fitted for commercial service, carried 150,000 soldiers to France during the war and brought an equal number home again. She was remodeled for passengers at a cost of more than $8,000,000.



"Sounding" a Used Automobile in Laboratory Where All Parts Are Tested and Recorded to Guide Repairmen Who "Condition" the Car; Above, Indicating Chart

Used Cars Tested in Laboratory to Find Exact Value

So that Chicago automobile dealers may know the condition of a used car taken in trade, a laboratory has been established in which every part of the machine is examined in thirty minutes. When the car leaves the test stand, it is said that every fault is known and its value can be exactly appraised. Special meters reveal any leaks in the electrical connections, the performance of battery and motor is compared with standards, a grounding gap shows the condition of spark plugs and ignition, a connection between the crankcase and a gasometer indicates the amount of gas escaping past the pistons, and under its own power the motor operates a brake to show the horsepower, while a specially devised flow meter measures the amount of fuel consumed. When all mechanical and electrical tests have been given, an examination for defects in the chassis and springs is made. The complete data tell the dealer how much it would cost him to overhaul the automobile. After it has been put into shape, it is sent through the "mill" again and then, if it meets the requirements, it is certified. This service is expected to speed up the resales of used cars, as it is claimed that the buyer can be certain the automobile he is getting is in first-class shape.

Bugs Are Called Man's Worst Foe; Cause Heavy Yearly Loss

Bugs are listed among mankind's most dangerous enemies by Dr. Leland O. Howard, a government scientist. Every year, it is estimated, they cost the American farmer $2,000,000,000. The United States, according to figures, pays more insect damage than any other country, as its climate and soil conditions favor the propagation of nearly a hundred destructive species. Almost all of them have been imported, despite the fact that there are now seventy-five investigating stations scattered throughout the country and one abroad, where experiments are constantly being made with the latest modes of warfare against the pests.

Music Rack Turns Sheets as Player Presses on Foot Pedal

To turn sheets of music without need of interruption to the player, a rack has been invented that reverses the pages when a foot pedal at the bottom is pressed. Resembling the ordinary type of stand, the device is adjustable to different heights and operates with very little effort from the player. The appliance can also be made to turn the scores to either the right or left, enabling the reader to follow the composition with ease. After reversing a leaf of music, the swinging arm is returned by a spring to the starting position ready for another movement.

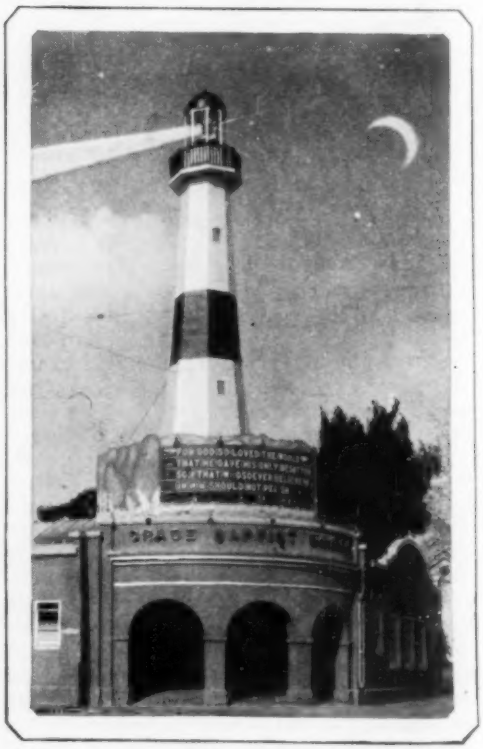
Music Stand that Turns Sheets when the Player Presses a Foot Pedal at the Bottom

Playful Porpoises Aid Punctuality by Oil Supply for Watches

From the playful porpoise to the delicate springs and balances of an expensive watch may appear to be a long leap, but the connection is direct for the porpoise plays an important part in helping man to be on time. From the spongy fat in the jaw pans of these creatures is extracted the best known oil for watches. It does not get too thin or too thick, keeps up lubrication at all degrees of temperature, and in almost every particular has proved superior to other kinds tried. To supply the demand, some 3,000 porpoises are caught each year, the principal fisheries being established on the coast of North Carolina near Cape Hatteras. The season usually begins the first of November and lasts until the following April. Lookouts give the signal when a school of porpoises is sighted. Then a crew of fishermen put out with heavy seines, and carefully approaching, surrounds them with the nets. Then follows the hazardous task of pulling in the catch over rough breakers while scores of fighting 500-pound porpoises, each about seven feet long, struggle for escape. After they are killed, the oil is extracted and prepared for shipment.

Model Lighthouse on Church Roof Is Substitute for Spire

Rising several feet from the roof of a California church, a model of a lighthouse, equipped with a revolving searchlight that has changeable colors, is an unusual substitute for the ordinary spire. Rocks around the base are representative of the "Rock of Ages," and the entire structure gives the suggestion of serving as a beacon against the shoals of spiritual disaster. The "steeple" is said to be the only one of its kind in the world.



Model of Lighthouse That Is Substitute for Spire on Roof of California Church

Paper Dresses on Models Display Latest Fashions in Gowns

Gorgeous-looking gowns and frocks that were made entirely of paper and worn by models, were features at a New York fashion show. Designed in different colors of various grades of paper, each dress looked like the expensive creation of a modiste, but even the most dazzling cost less than one dollar. The dresses were worn by the models as a novel method of displaying the latest fashions in gowns.

Arrayed in Gorgeously Colored Paper Replicas of Fashionable Gowns, These Models Displayed the Beauty of the Original Dresses with Imitations Costing Less than a Dollar Each

Sun's Energy Stored Up by Plants Turns Heads toward Light

Some unusual chemical effects of light on plants have been described by Dr. W. T. Bovie, of Harvard, who declares that his experiments have proved it possible to determine the direction of growth by cutting off tops, exposing them to light from given directions and then reattaching the tops by a gelatin cement. After regrafting the top, following its special treatment by light, the whole plant would bend in the direction from which the rays had been directed at the amputated part, it was declared. While it has been well known that a growing plant would twist itself into a position so that the top would receive the maximum of direct light, this experiment indicated that the chemical "steering apparatus" which regulated the plant's bending could be manufactured in the top even after the plant had been decapitated. It also is said to have shown that the specific chemicals manufactured by the sun in plant tops could be stored up in the part and later released into the sap, retaining the power to affect cells in all parts of the growth and cause remarkable distortions in the branches.

Chair, Stool and Table Combined to Save Apartment Space

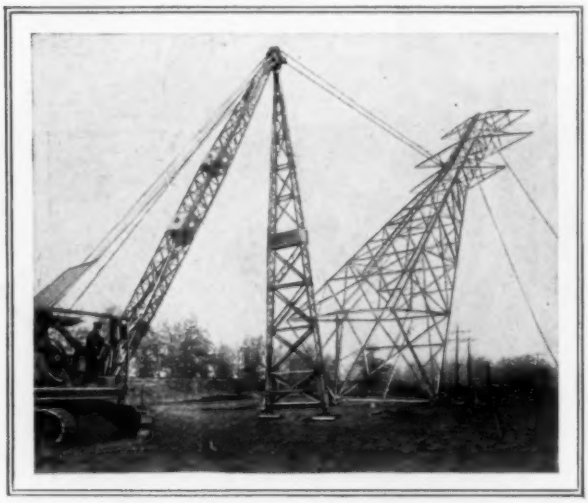
Constructed so that it can be converted quickly into a music stool or table, a comfortable and strongly built armchair has parallel bars at the sides to support the upholstered seat at any desired height.

Convertible Chair with Seat Raised to Form Stool, and Placed as Table Top

A table is formed by placing the cushion, bottom side up, on the top bar below the horizontal chair arms. The article is manufactured in mahogany, is covered with various kinds of fabrics as desired and can be satisfactorily used in almost any room of the house.

Derrick on Tractor Raises Towers Built on the Ground

To raise heavy structural-steel transmission towers into position after they are built on the ground, a combined tractor and derrick has been devised that can easily move along the routes of power lines. It is said that, by erecting the cable supports before they are set up, much time and expense may be saved. The structures may be assembled close to their anchorage and when ready for elevation, are hauled upward by cables reeled in by the lifting machine. Tank treads on the tractor enable it to move over almost any character of land, and the derrick girders can be quickly put up for use or dismounted.



Tower-Raising Machine Lifting Steel Transmission-Line Support into Position after Assembly on Ground

Cleaning of Golf Clubs Made Easy by Novel Holder for Table

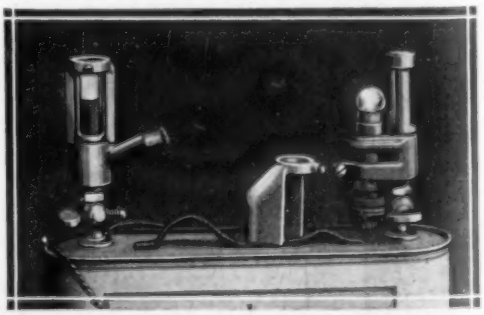
Keeping golf clubs clean is simplified by a small holder that has been introduced in England. It consists of a metal frame that has two jaws lined with a soft material, permitting a firm grip without risk of damage. The club can be turned by releasing the jaws slightly, so that all parts may be reached without further change.

U. S. Wealth Rises Seventy Per Cent during Last Ten Years

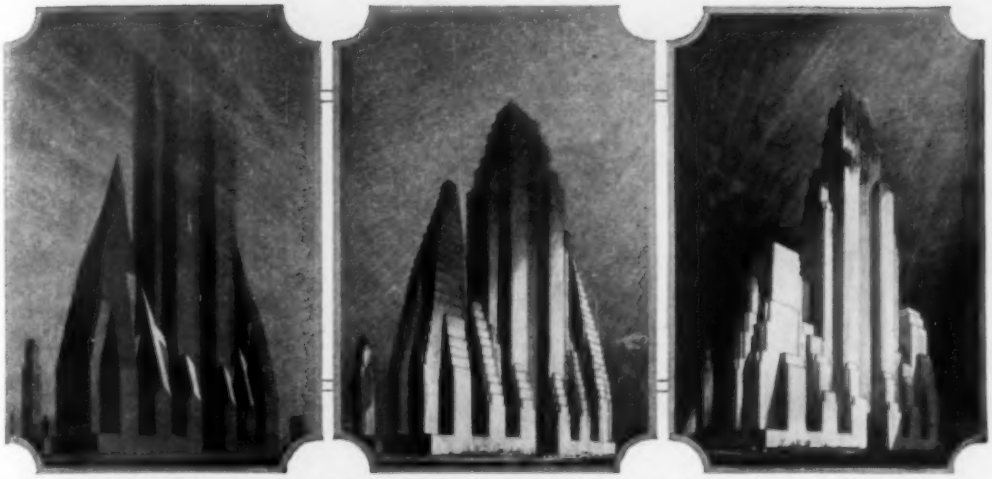
Wealth of the United States is now placed at $320,803,862,000 according to reports of the census bureau, an increase of 72.2 per cent since 1912. On this basis, every man, woman and child in the country is worth $2,918, a sum 49.6 per cent greater than was reported as the per-capita wealth little more than a decade ago. Most of this enormous total is represented by real property and improvements, and all classes of property show an increase in value except live stock, which decreased 6.9 per cent. Rises in prices, it is stated, largely explain the increases in money values. Taxed real property and improvements are valued at $155,908,652,000, an increase of 60.9 per cent; gold and silver coin and bullion, $4,278,155,000, an increase of 63.5 per cent; farm implements and machinery, $2,604,638,000, an increase of 90.4 per cent; manufacturing machinery, tools and implements, $15,783,260,000, an increase of 159.1 per cent, and railroads and their equipment, $19,950,800,000, an increase of 23.5 per cent.

Lamp to Light Ford-Car Oil Gauge Aids Proper Lubrication

For the convenience of Ford-car owners, an inventor has designed a small electric light fitted in a bracket back of the oil gauge. Current is supplied from the car batteries and a metal shield incloses the bulb, which is lighted when desired by the pressure of a button. Use of the lamp eliminates guesswork when filling and insures the exact quantity for best results.



At Left, Lamp Is Lighted behind Gauge; Side View of Bracket at Right



Illustrating New York's Building Restrictions: Possible Cubical Mass Permitted under Law; Artist's Application of It to Actual Construction, and Its Development by Architects into Pleasing and Efficient Structure

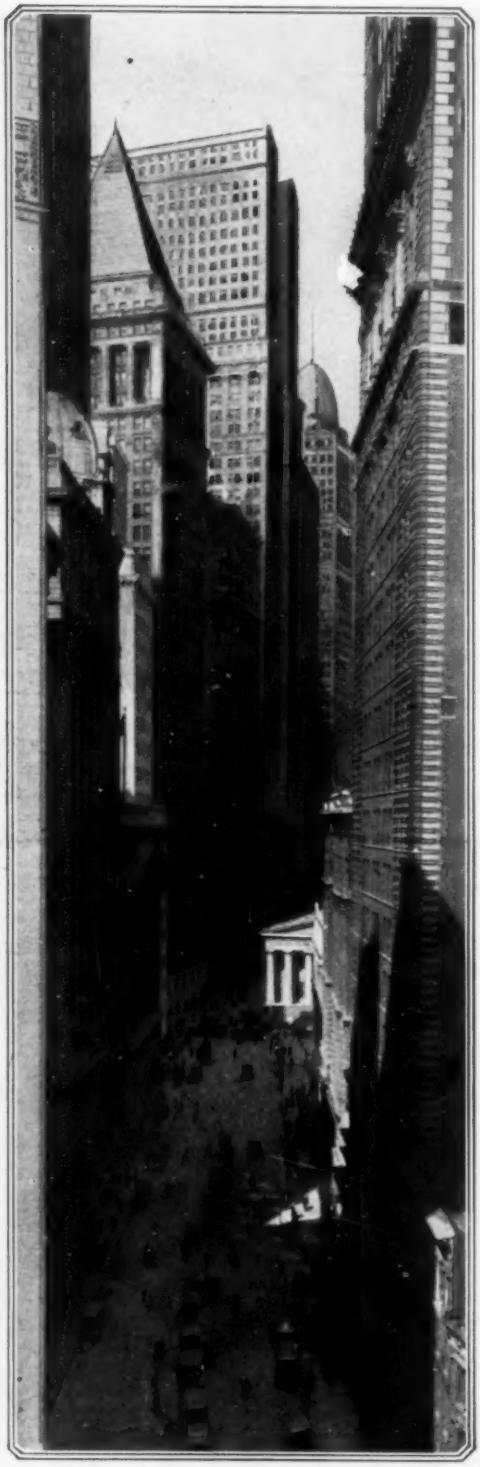
The City of the Future

Terraced, Receding Walls to Open Canyons of Business Districts and Double-Deck Streets to Speed Traffic

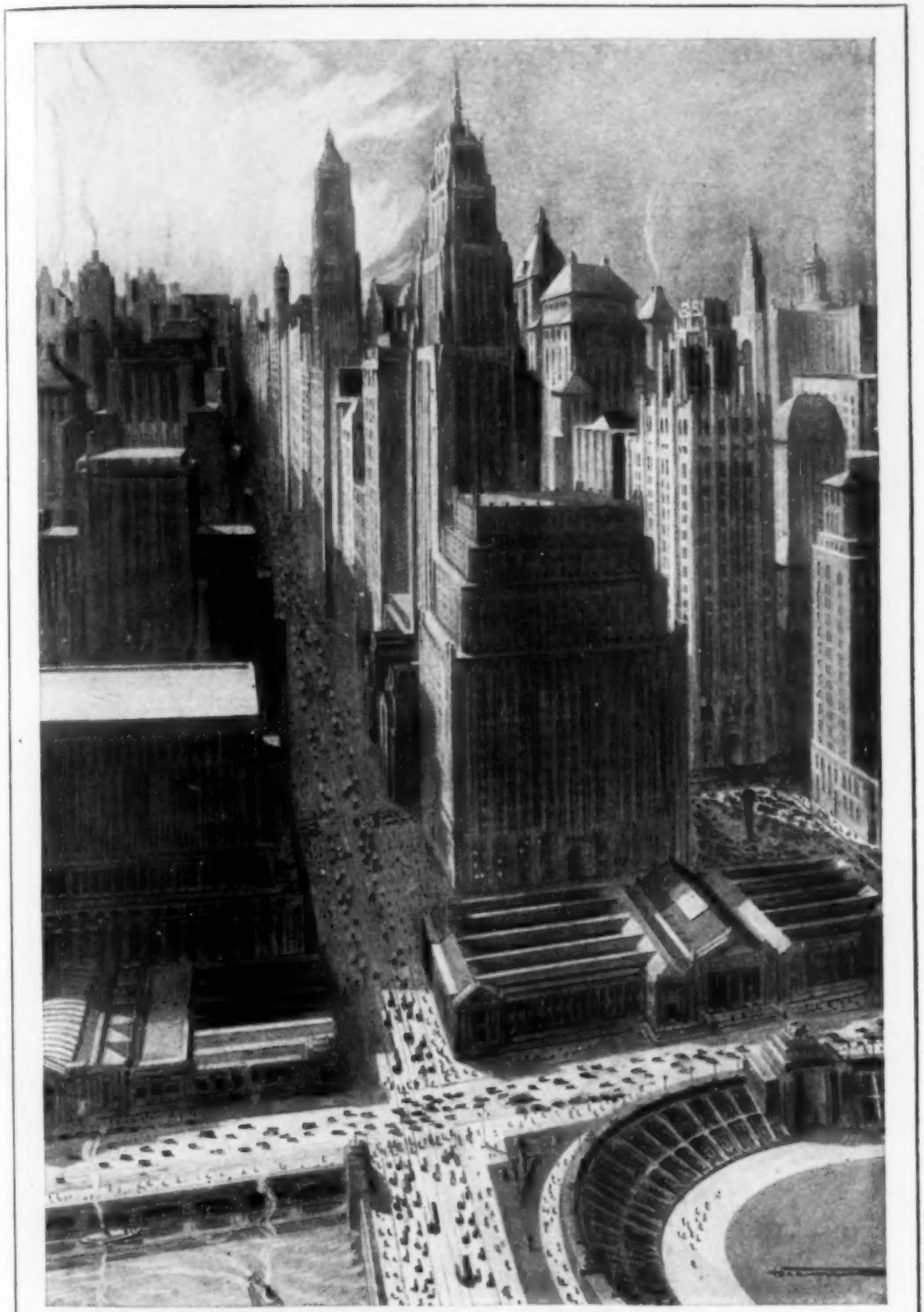
TAPERING from wide massive bases into terraced floor levels that gradually recede from the streets, modern architecture is expected to abolish the dark canyons that trace somber chasms across the crowded business districts of the city of today. Beginning with a provision in the recently adopted building laws of New York, which requires the stepping back of buildings from the street line, architects and builders have turned their attention to the designing of structures that will insure greater access to air and sunlight and provide a greater degree of safety from fire hazards. Because the law governs the air line as well as the ground lines of property within certain city divisions, architects are called upon to plan structures affording the greatest possible amount of space within the bulk of building permitted. The maximum bulk allowable is that nearest the ground. Above this "base," and decreasing with each few feet upward, the plan shrinks inward toward the center, providing apertures between buildings that grow wider with the height of the structures. Around this cubical air "plan" the designs of the buildings must be laid, generally resulting in gracefully tapered, stepped-in or pyramidal forms. Departing from the traditional forms of architecture, designers have already produced office buildings, lofty church edifices and even hotels with a certain regard for the circulation of air and access of more light

Old Oriental Temple of Pyramidal Design Somewhat Related to Architectural Trend of Modern Building

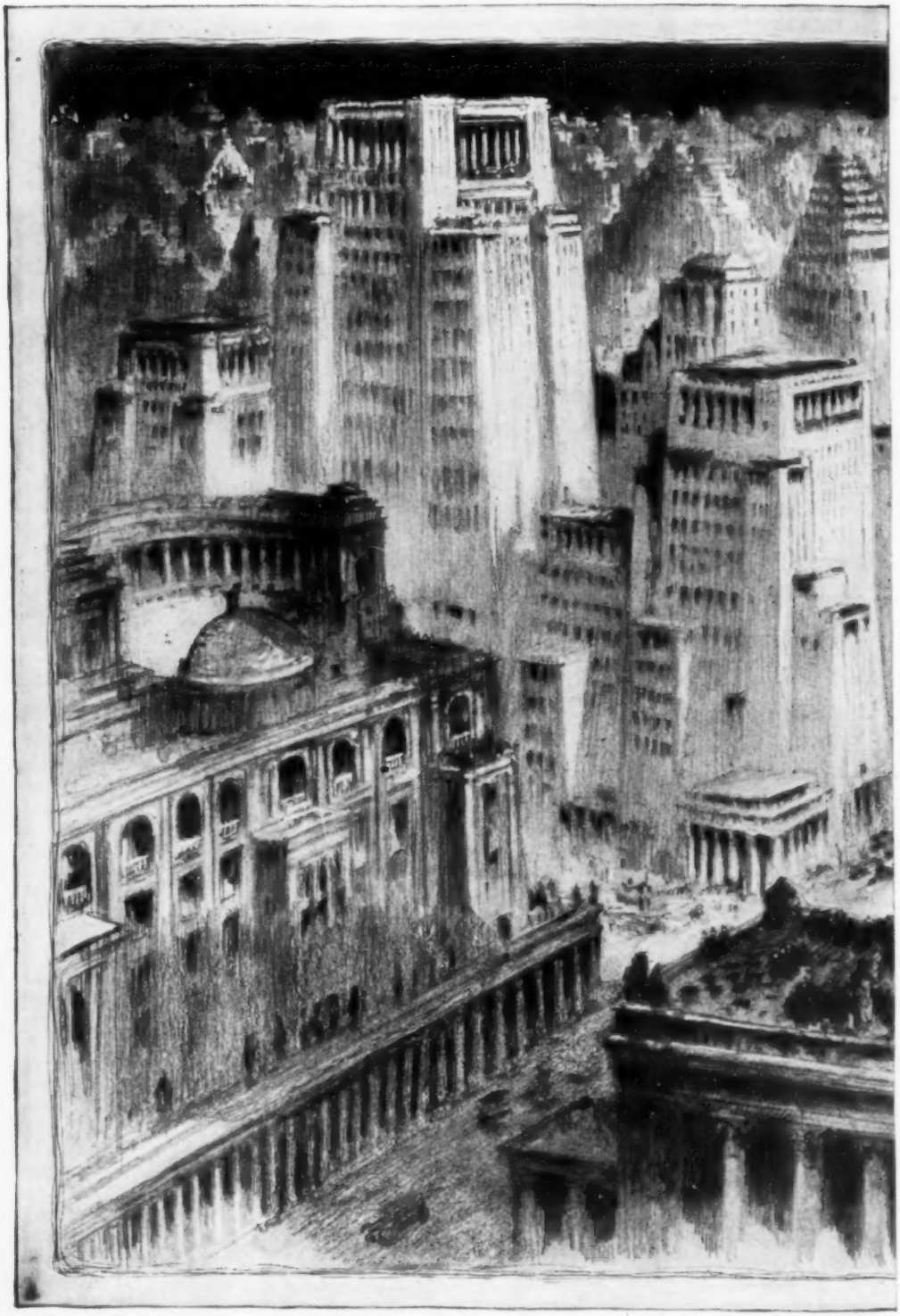
than ordinarily provided, to the benefit of those whose workdays and lives are spent in the confines of such structures. And although the buildings retain many of the general lines seen in earlier architecture, the tendency is toward the tapered type, and points to the future office building that will rise majestically in tiers without the customary scrolled masonry at the eaves and cornices. To use the words of an authority, "the scheme sought is to follow as nearly as possible the shape of the steel construction which lends its strength to the structure." At certain measured heights of the terraced buildings the levels may be spread out and used for gardens, open-air theaters and churches, while around the larger structures promenades might be provided far above the din of busy humming thoroughfares. Combined with these ideas in building are suggested plans of elevated sidewalks and sunken streets, that are expected to relieve congestion of traffic in crowded districts. Not only would such arrangements aid in solving problems of civic development, but, it is claimed, would also permit greater value in show-window space, because second-floor displays could be made possible to merchants, thus adding further to the benefits derived from more efficient traffic control. In New York, triple-deck streets diverting vehicle, foot and street-railway traffic into three separate levels, have been proposed to gain greater freedom in the business districts for all classes of conveyances and the pedestrians. According to one of the sponsors of the plan of decking the streets, the idea instead of being of modern origin, is said to date back to olden times, when Leonardo da Vinci made a number of drawings, which are still preserved, for double-decking the streets of Milan. On the lower plane he planned to keep the horses, cattle and peasants, while the upper street was to be reserved for the aristocracy. Arcades have also been incorporated in proposed plans to eliminate store and shop entrances from the path of pedestrians along the sidewalks, thus creating expansive arched promenades on the floors of large buildings, and connecting with the streets from the lower levels. Other big cities, traversed by or bordering on waterways and which purpose improvement in present-day methods of providing adequate traffic movement, have made allowances in their plans for wharves submerged below the streets and connecting with distributing centers by means of a



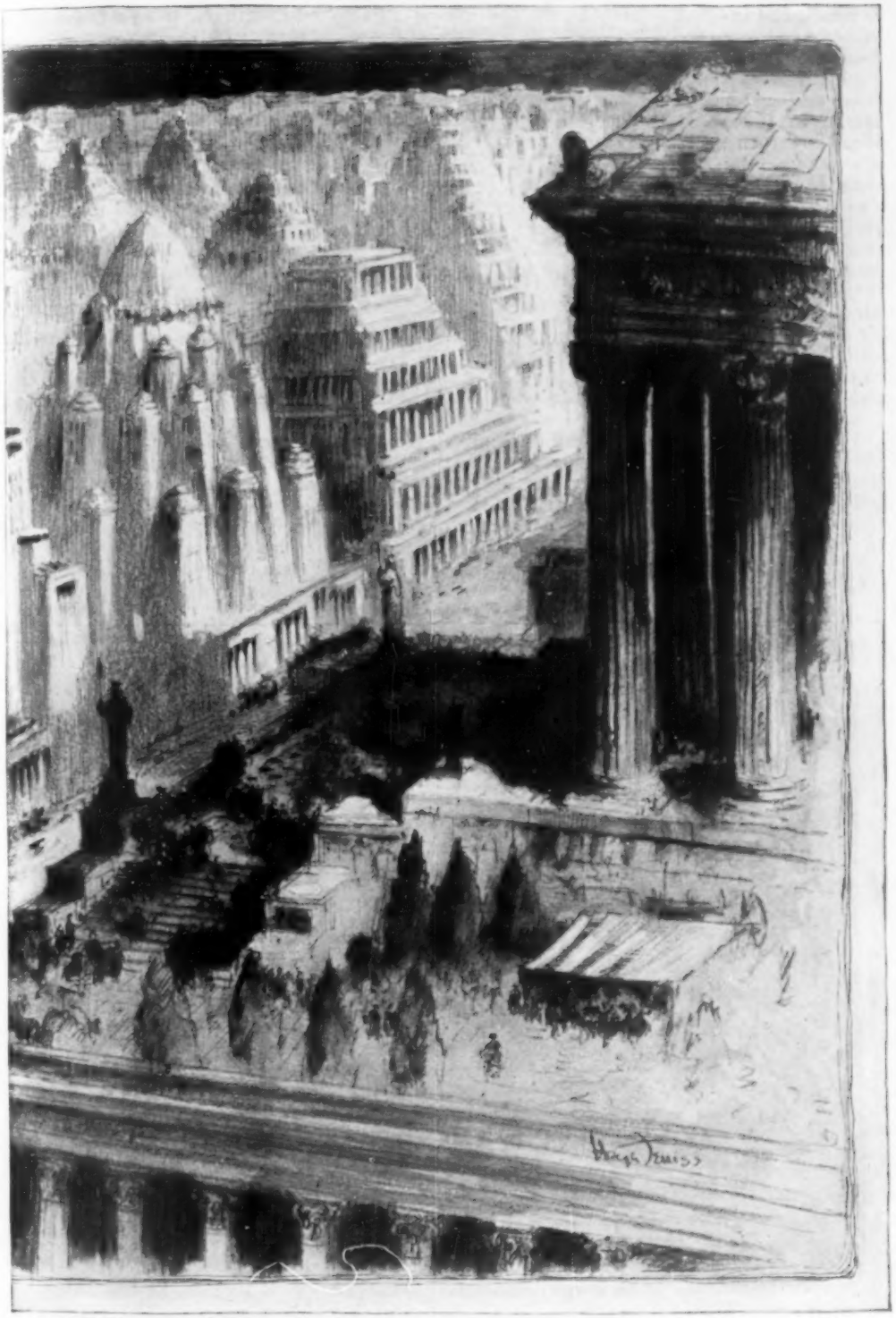
Somber Canyon of Building Walls Where Terraced Architecture Would Give Access to Light and Air



Artist's Grouping of Recent'y Completed and Proposed Skyscrapers of Several American Cities, Showing the Tendency of Modern Architecture Toward the Receding, Terraced Design of Building Construction

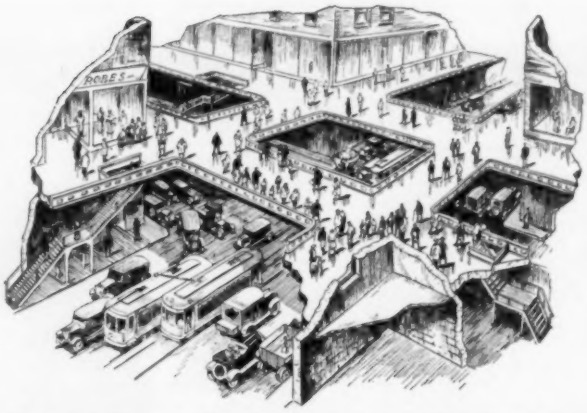


Glimpse of New York a Half-Century from Now, as Seen by Hugh Ferriss, Architectural Artist, Which Illustrates the Zoning Law Adopted by the Metropolis to Insure Light and Air Space



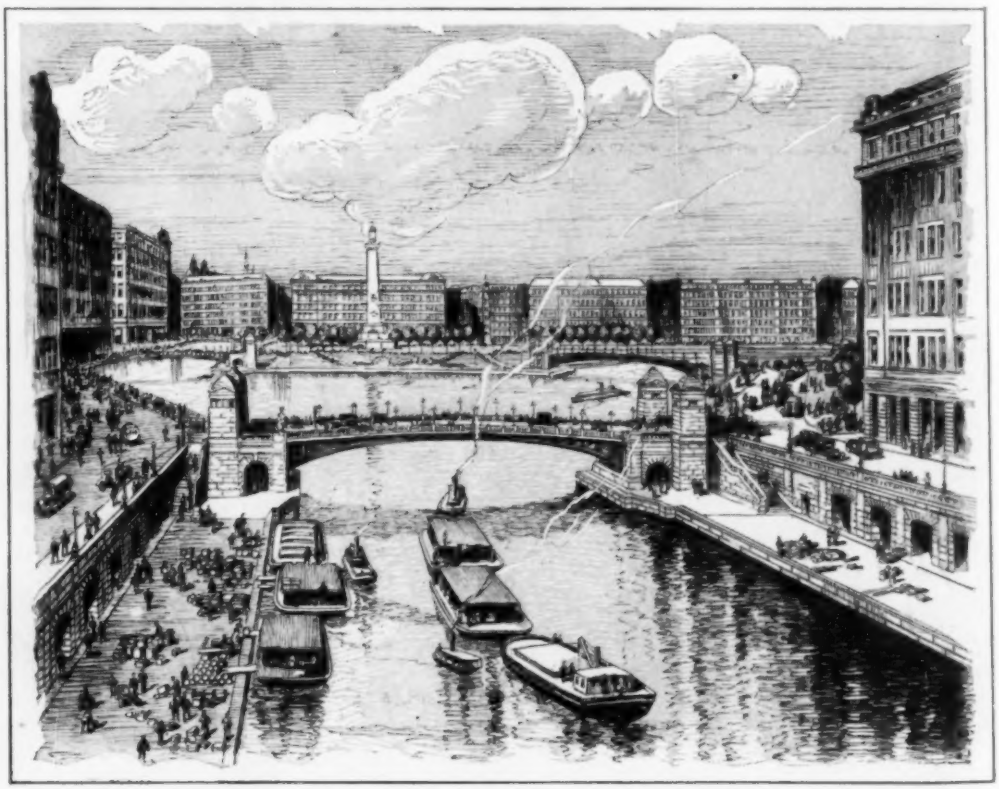
It Is Predicted That, with This New Pyramid Form of Structures for Big Cities, the Terraced Levels Will Permit Development of Gardens and Open-Air Theaters Hundreds of Feet above the Sidewalks

series of tunnels passing under the buildings. Both land and water traffic in these ideas are to be assisted by drawbridges spanning the rivers and inlets at convenient points, whereby shipping and lighterage service can be accommodated with passage close to loading places.



System of Elevated Sidewalks Suggested for Chicago's Business District to Relieve Pedestrian and Vehicle Traffic

While the change from the straight severe wall of the familiar skyscraper to the terraced-block building is taking place, greater heights are being sought for future structures with corresponding efforts in beauty of form. Where formerly twenty or thirty stories have been considered a fairly substantial height, now massive business blocks of forty to fifty stories, able to accommodate the population of a good-sized city, are being planned. To care for the additional weight foundations and bases are to sustain, the gradually decreasing width of upper floors within specified heights has been designed. This arrangement also affords a better supply of air and more sunlight than the older forms of architecture found in the cities of this country. Inner courts have given way to outside "free spaces" while hazards from fire are greatly decreased and at the same time the artistic appearance of the structure is improved.



Venetian-Like Plan Submitted as Means of Solving Chicago's Problems of Civic Improvement by Building Roomy Underground Tunnels for Shipping beneath Structural Combinations of Art and Utility

Toy Golfers on Miniature Course Imitate Open-Air Game

Moved with a spring released by a player, a mechanical toy man strikes a ball in an indoor golf game resembling that played over an open-air course. The imitation greens contain nine holes with small "hills" and "water hazards" to make the contests difficult. Skill of the player in setting and posing the "golfer" decides the accuracy of the pellet's flight after the stroke. The miniature fairway is seven feet long and three feet wide, and can be easily set up or put away in a few minutes.

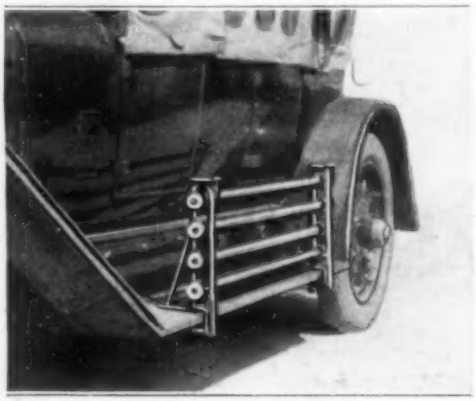
Miniature Golf Links on Which Mechanical Toy Figures Contest Game; Left, "Player" Completing Full Swing Stroke; Right, Putting on the Green

Deep-Sea Seekers for Pearls Win Fortunes from Ocean Bed

Scientific methods of diving for pearls in Australian waters have resulted in increased profits, it is reported. Steam-driven boats are used and the latest diving suits permit the searchers to remain below a considerable time instead of the few minutes that were the limit of the natives. The depth in which the men work varies from sixty to 144 feet. Two or more divers can descend from a single boat, each equipped with a bag. When the container is filled it is attached to a rope, the signal given and it is hauled to the surface to be emptied and sent down again. The shells are opened in the presence of the skipper. The oyster is removed, and although edible, is thrown back.. The shells are searched for pearls and, if any are found, the captain takes charge of them. Pearl diving and pearl fishing are separate industries. The efforts of those engaged in the latter work are directed primarily toward collecting pearl shells used in the manufacture of articles made from mother-of-pearl. The finest shells for this purpose are said to be found in the warm waters off northern and western Australia, where approximately 3,000 men are engaged in gathering them.

Tent Poles and Auto Luggage Rack Are Combined for Tourists

Carried conveniently in a rack clamped to the running board of the automobile where they form a handy luggage carrier, a set of metal tubes with couplings so arranged that they can be fitted together to form poles and supports for tents of various sizes and styles has been manufactured. Wooden poles can be carried inside the hollow metal ones to form additional lengths. In place on the car, the tubes are locked between the sides of the bracket holder so that they cannot fall out.



Metal Tent Poles in Rack That Forms Handy Luggage Carrier on Running Board

Phone Permits Several to Listen or Talk at Same Time

To save time in large offices and eliminate the necessity for making repeated calls on the telephone, a small switchboard,

Party Telephone Instrument in Use; Keys Below Connect Offices in Any Combination Desired

transmitter and receiver have been combined into one compact instrument that can be placed on top of a desk or in any other convenient position.. With it, the speaker can communicate with a number of offices and receive replies at the same time. It is designed especially for executives and managers.

Pulling Power of Horses Measured by Tests with Weighted Wagon

To measure the pulling power of horses, a testing wagon geared to heavy weights has been invented at Iowa state college. When the team is started, the weights, the number of which can be changed at will, are lifted and the exact amount of force exerted is registered. Lifting a 1,600-pound weight on this wagon is figured as the equivalent of pulling the same burden out of a hole in the ground or starting a load of more than 20,000 pounds on a granite-block pavement. In the opinion of experts, this will eliminate much guesswork as to the actual work value of farm horses and will also show what sort of roads are best suited to hauling heavy traffic. Some of the interesting facts already revealed by the apparatus are that loads are most easily pulled on steel rails and that level granite blocks, set firmly in cement, offer the next easiest path; that good roads practically treble the pulling capacity of draft teams and that horses and mules possess reserve power sufficient to exert six or eight times as much tractive pull as is required in ordinary work. It is estimated that the use of the device will enable farmers and others to reduce by nearly one-third the expense of hauling by placing horses and mules where they can do the most efficient work.

Finds Way to Keep Poppies Awake

Poppies and other flowers that close their petals at sundown can be made to open them at night, according to Luther Burbank, the plant wizard. The flowers should be cut before daybreak while their petals are still closed, he says, and then placed on ice for the day. In the evening, arranged in a vase filled with water and exposed to the warm air of a room, they respond to the heat by blooming.

Pull-Measuring Wagon in Operation; When Team Is Started, Weights in Front Are Raised on Hydraulic Platform While Operator in Rear Controls and Observes Their Action

Memorial and One of the Searchlights That Illuminates It, Built into Miniature Rockery

War Memorial's Beauty Revealed by Battery of Searchlights

So that a war memorial erected on a hill in the center of a large park in an English town could be illuminated without having the searchlight apparatus detract from the beauty of the view during the day, the four lights were built into miniature rockeries on the ground that blend with the general plan of the park. They were mounted in specially constructed steel casings for protection, and during the day the glass faces are covered by metal doors. Under this plan the memorial is illuminated by a total of 12,000 candlepower with no objectionable framework supports visible.

Japanese Art of Self-Defense Is Shown in Mock Duel

Clad in strange armor, a number of Japanese gave a demonstration of the art of self-defense in London, in which the combatants, equipped with rounded clubs, engaged in a number of duels. Centuries ago, the samurai or bushi as the military men called themselves, gained great power in Japan by the use of the bow and arrow and the sword. The "military party" was thus established and many systems of combat sprang up and were eagerly studied. The important feature in all of them was to tire out an adversary with a minimum of effort and to be prepared for any emergency. Jiujitsu developed from study of swordsmanship.

Japanese in Native Armor Illustrating System of Self-Defense by Mock Duel

¶In southwestern Kentucky is a mine where asphalt rock is taken out like coal.

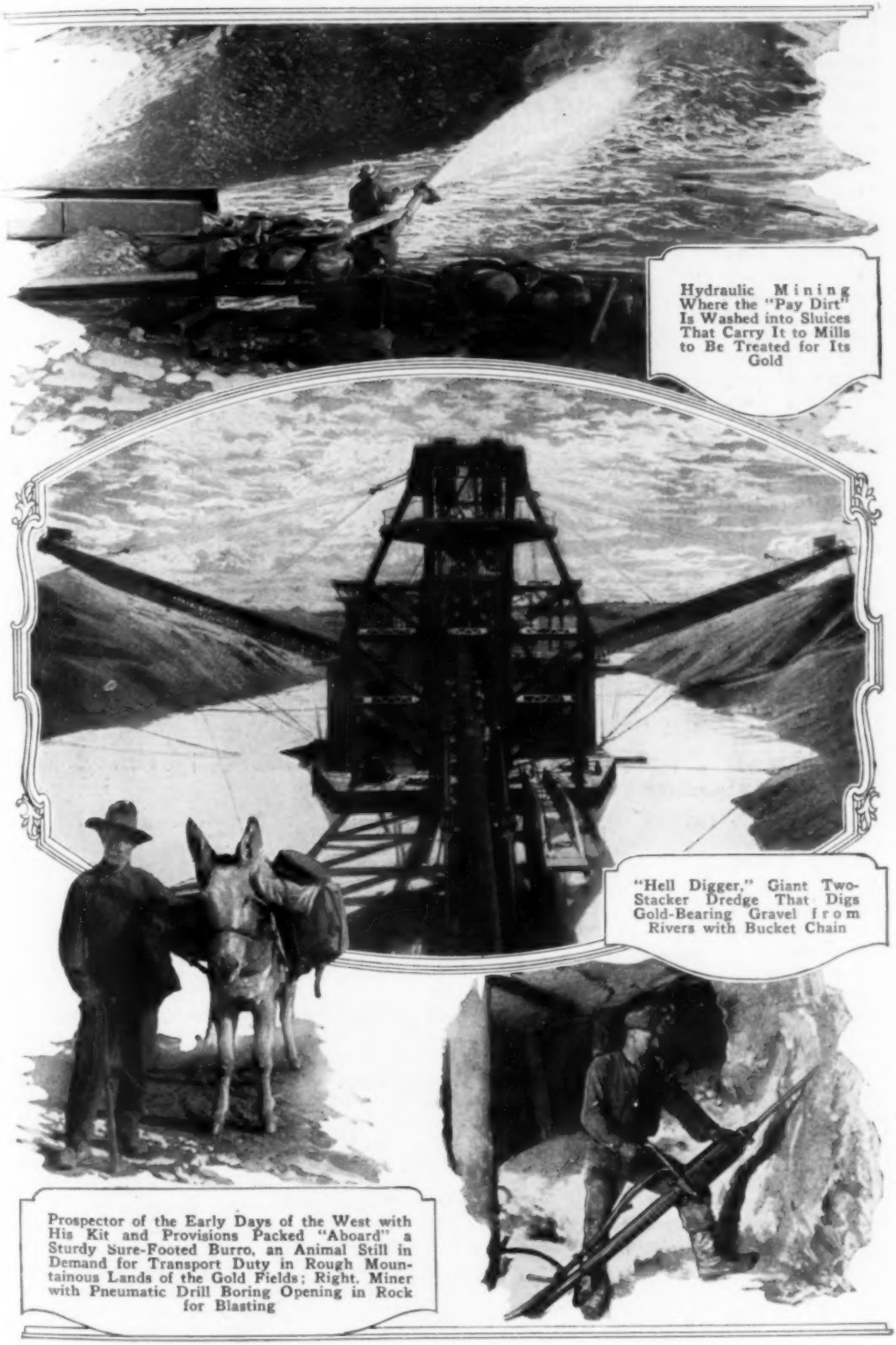
Gold Seekers Revive Camps of Forty-Nine

Modern Processes Reclaiming Mine Dumps and Deserted Shafts Abandoned by Old Trail Breakers of Boom Days

RECALLING the days of '49 when the contagious germ of gold fever urged heroic pioneers to brave the hardships of a raw and unknown country and to face death at the hands of hostile bands of Indians, abandoned mine workings and "dumps" they deserted as exhausted operations, are being revived into producing fields yielding rich deposits of metal that escaped the crude processes of the old days. Modern cities and towns that have grown up on the sites of the camps that once dotted the mountain regions of the west are in many cases assuming appearances resembling the thriving "boom" days, when toil-worn prospectors gathered to swap yarns and experiences in dimly lighted shacks that answered as hotels, stores and even banks. Instead of consigning the glittering mineral to the care of "shotgun" messengers, sworn to the service of their employers in defense of the treasured shipments, the gold, melted into bars, is now transported to collecting centers in swift and well-guarded cars.

The tobacco-chewing, swearing, knotty-handed but loyal stage driver has gone before the irresistible march of a civilization that banished the western road agent and train bandit of the sixties. His place has been taken by trustworthy men in employ of the railroads which carry the products of the gold fields safely to markets.

With the coming of "hell diggers,"—dredges—into more general use than ever before and the discovery of better processes of recovering the metal, renewed activity points to another series of booms in the heart of the gold-mining country. Old "tailings" are being cleared from abandoned shaft openings and cleaned of their metal contents which has remained often for more than half a century unsought and hidden in the piles of cast-off soil and rock dug from the depths of surrounding hills. New tools have come in place of the



Hydraulic Mining Where the "Pay Dirt" Is Washed into Sluices That Carry It to Mills to Be Treated for Its Gold

"Hell Digger," Giant Two-Stacker Dredge That Digs Gold-Bearing Gravel from Rivers with Bucket Chain

Prospector of the Early Days of the West with His Kit and Provisions Packed "Aboard" a Sturdy Sure-Footed Burro, an Animal Still in Demand for Transport Duty in Rough Mountainous Lands of the Gold Fields; Right, Miner with Pneumatic Drill Boring Opening in Rock for Blasting

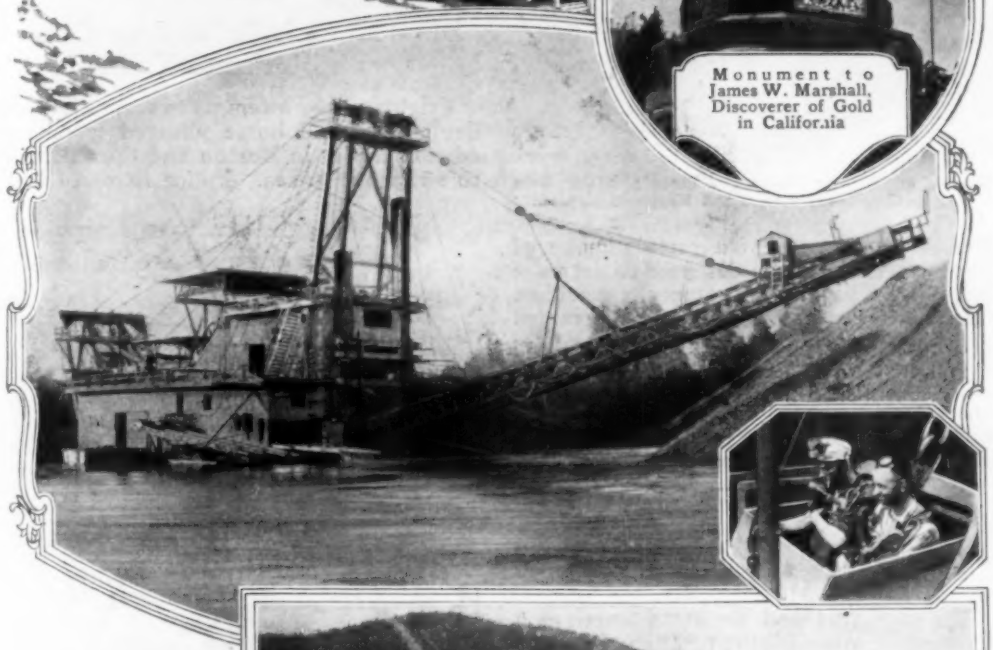
inadequate pick and shovel and familiar blasting powder. Test drills are sunk thousands of feet below the ground in search of veins or leads that may have been overlooked or unsuspected by those who combed the regions of gold-bearing rock in the past. Expansive workings which have been producing for more than sixty years are sounded anew in the hope that they might reveal some trace of an untapped, hidden lode. Shafts driven to depths considered to be at the limit of the mineral-laden soils have been extended hundreds of feet beyond, resulting in the opening up of strata offering yields of gold undreamed of by old-timers who would have derided such efforts a short few years ago. Tumble-down shack camps, weed-choked drift mouths and old trails long since abandoned to the ravages of time by those who believed the districts they occupy to be drained of pay dirt, have taken on a new attraction to the modern gold seeker who comes into the field with equipment designed to salvage the tiniest particles of the yellow dust. Workings and chambers filled with water seeping from the ground over many years have been pumped dry, cleared of fallen rock, the roofs supplied with new proppings, and digging begun again with tools operated by humming motors. Tracks are laid to the crushers and stamping mills run by electric power carried on lines that traverse the mountains for miles, and soil once scorned as useless from the viewpoint of the miner is made to give up yields of gold averaging high returns.

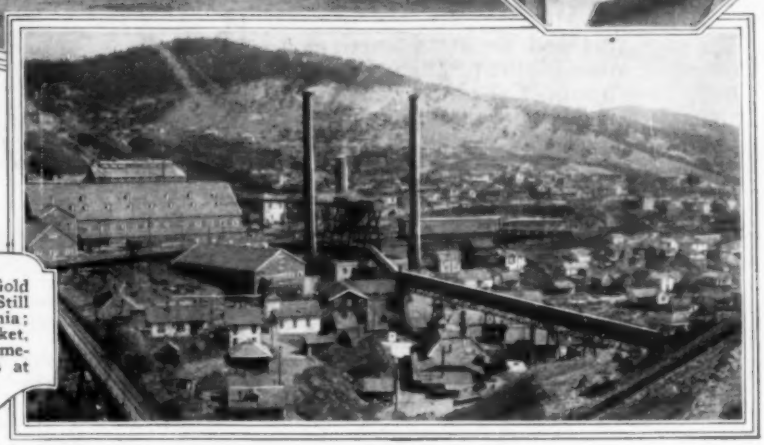
Old-Time Prospector, of the Days of Forty-Nine, Panning the Sands of a Mountain Stream in Search of Gold

While many mines that operated forty to sixty years ago have been abandoned as worked out, a number of large operations put in at the same time have produced steadily ever since. In the northern part of the Black Hills in South Dakota is the Homestake mine, first worked in the spring of 1876. From a claim of ten acres this property has spread to include thousands of acres of land containing timber stands, mineral deposits and watercourses. This mine has produced nearly three-fourths of the $190,000,000 worth of gold and silver taken from the district in forty years. It has approximately fifty miles of underground railway track and requires about two and a half tons of dynamite to assist the 575 drills which daily bite their ways into the flintlike rock. Hundreds of tons of refuse dirt lay for a long time around the mine openings, considered worthless because no means of salvaging the fine particles of valuable metals they contained was known. Then a new method of smelting was developed and the heaps were reclaimed and gleaned of hundreds of pounds of gold once thought impossible of recovery. Despite almost a half century of continuous digging, there is said to be still twenty years of work left to be done in the mine, and no apparent indication of the ore veins diminishing is in sight. However, new ore leads and cheaper mining methods are still sought there.

Gold Miners "Going on Shift" Awaiting Elevator Cage Which Carries Them Underground

Monument to James W. Marshall, Discoverer of Gold in California





One of Earliest Gold Dredges Which Is Still Operating in California; Miners in Its Big Bucket, and Right, Part of Homestake Mine Properties at Lead City, S. D.

Soundproof Cabinet on Typewriter Decreases Noise in Offices

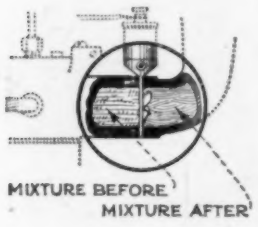
Soundproof cabinets which inclose all but the keyboard, carriage-reversing and

Typewriter Silencer Cabinet Adjusted; Work Seen through Top Glass, Levers and Keyboard Exposed

line-spacing levers of a certain make of typewriter, have been designed to decrease noise in offices and to protect the machine. They are manufactured of metal, grained to harmonize with other furniture, and are lined with thick, sound-absorbing felt inside. The slanting top is of glass so that the typist can see the work, and the cover is raised automatically at the touch of a small button.

Automatic Primer Saves Gasoline and Makes Car Easy to Start

To save fuel and facilitate starting, a device that atomizes the priming charge of gasoline has been designed to fit any make of automobile or truck. It is installed between the carburetor and the intake manifold and works automatically. When the starting pedal is pressed, a valve operated by a magnetized coil throws a jet of gasoline against a set of stationary blades. These break up the globules of the liquid which is sucked into the cylinders as a whirling vapor, easily ignited. Less carbon, longer life for the batteries and greater ease in starting the engine in cold weather are also claimed for the invention, and it can be installed with little trouble.



Making Wood from Corn Cobs

Corn cobs are said to have been turned into a good substitute for wood by Prof. Darling of Milliken university. The cobs are ground into a pulp, mixed with a substance that binds the product together and compacted by powerful hydraulic pressure. When the process is finished, it is said the wood is so hard that it can be whittled, shaved or turned in a lathe without danger of chipping.

Blind Horse Is Pulled from Ocean with Block and Tackle

Frightened by attempts to rescue it from danger, a blind horse plunged from the edge of a pier in Boston and then started to swim out to sea. Police followed in a

Blind Horse that Plunged from Pier Being Lifted Out of the Water with Block and Tackle

boat and finally succeeded in towing the animal back to the dock where it was lifted out of the water with a block and tackle.

British Engineer and His Wife on Their Ocean-Going Lifeboat Which They Have Fitted with Sails and Engine for 16,000-Mile Cruise to Australia

Lifeboat Fitted for Ocean Voyage of Sixteen Thousand Miles

Equipped with sails and a seventeen-horsepower engine, an open lifeboat has been rigged by a British engineer to take himself and his wife on a 16,000-mile ocean cruise. Starting from Penzance, near Land's End, England, the navigators will guide their craft to Australia, taking turns at the wheel by day and night. The engine will be used in times of calm.

Summer Sun Reveals Desert Sands in the Wilds of Alaska

Shifting sands, having all the characteristics of the Great American desert and constituting a menace to inexperienced travelers, have been discovered in Alaska, according to reports from prospectors. The reason this desert of the far north has not been found before, the miners say, is that trips over it have always been made in winter when heavy snows conceal the true nature of the country. Last summer, however, some prospectors started back over the route when they encountered conditions that made them apprehensive. Where, in the winter, the old trail had appeared to lead across a level plateau, they reported finding immense sand dunes and the entire landscape changed. In summer the winds start the sands moving in the same manner as on the American desert and changing of landmarks makes it difficult to travel.

Detective Camera Like Telescope Has Dummy Front Lens

Shaped like a small telescope, a pocket camera that takes pictures at right angles to the line of vision, has been designed especially for the use of detectives, or others who desire to obtain photographs without the knowledge of the subjects. A dummy lens at one end resembles that of a field glass. Thus the user is able to take a picture at right angles to the ostensible line of vision. The view finder is contained in what appears to be the eyepiece. The camera can be focused to less than a yard or to "infinity," and uses plates or film.

¶ High-grade paper is being manufactured from waste cotton.

Each Nail and Point in Wooden Statue Is Congo Tribesman's Prayer for Vengeance

Prayers for Revenge Said by Nails Driven in Wooden Statue

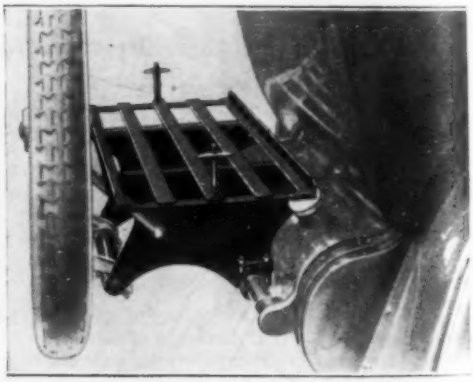
One of the latest additions to the University Museum at Philadelphia is a curious wooden statue bristling with many nails and sharp metal points. It is one of the fetishes commonly found in western Africa not far from the mouth of the Congo river where natives practice weird religious rites. Each nail and point represents a prayer to the spirit believed to dwell in the figure for vengeance on some enemy of the tribe. A priest and a party of followers go into the forest and cut the statue from a live tree. While it is being prepared, only the names of persons whose death they desire and whose spirits they wish to enter the statue, are spoken. As soon as it is dedicated with proper rites, the figure is supposed to become the dwelling of spirits that award justice.

Rapid Growth of Canning Industry Aided by War's Demands

Due to the tremendous demand for foods packed so that they could be easily shipped, the world war with its huge orders for "corned willie" and many other goods, was the greatest impetus the canning industry has had since its introduction in America in 1815, according to an official of the Sacramento, Calif., chamber of commerce. In 1914, the value of all canned food products here was placed at $243,000,000. Today, it is well above the $600,000,000 mark. Peaches are said to be the most popular of canned fruits and salmon leads among the sea foods. Nicholaus Appert, a Frenchman, invented the process of hermetically sealing food products. His idea was to use the plan for sailors at sea, but the French government purchased the invention and Napoleon allowed manufacturing plants in England and France to use the process. When Ezra Daggett, an American, introduced the business into this country, cans were made by hand, sixty being considered a big day's work for one man. With the invention of the stamped can, in 1847, the growth of the industry has been rapid.

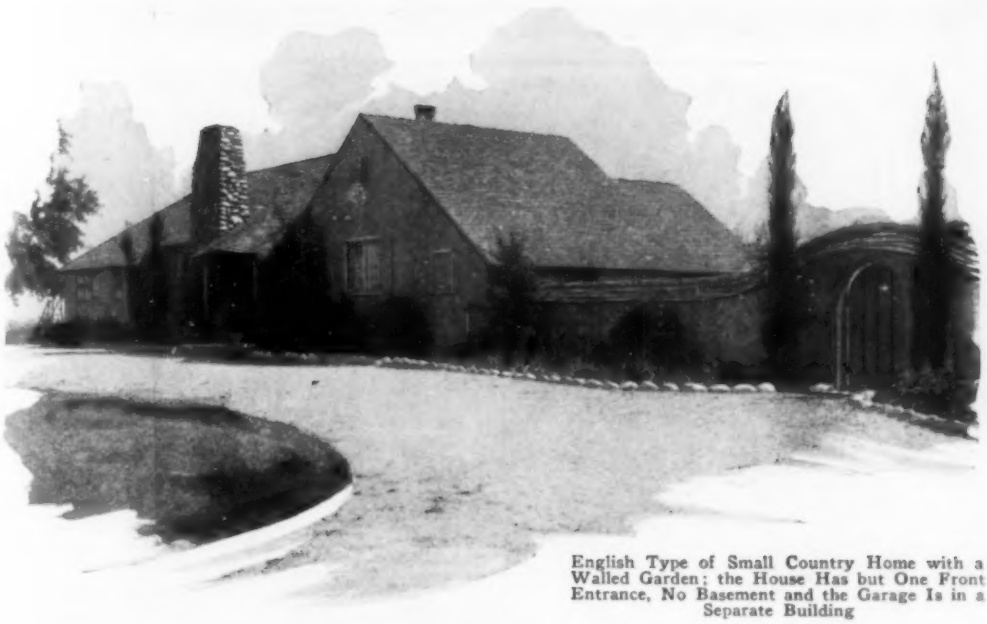
Auto Trunk Rack Easily Changed into Luggage Carrier

By simply lifting two hood fasteners, an attractive trunk rack now on the market may be turned into a luggage carrier. Neat in appearance and yet durable and rugged, it may be installed in half an hour without drilling, tapping or fitting of any kind. The



Automobile Trunk Rack Which May Be Converted into a Luggage Carrier by Lifting Two Fasteners

trunks are built of kiln-dried lumber, covered with long-grain, black material and bound with aluminum edges.



English Type of Small Country Home with a Walled Garden; the House Has but One Front Entrance, No Basement and the Garage Is in a Separate Building

Beauty and Utility United in Latest Homes

Ornate Houses Occupy Small Space and Combine Art and Comfort with Labor-Saving Equipment That Cuts Building Costs

EQUIPPED with built-in beds, dressing tables and chiffoniers concealed behind paneled doors and mirrored walls, in rooms that can be changed in a twinkling from cozy living rooms to comfortable sleeping and dressing chambers, houses of the four and five-room bungalow type are now being designed with conveniences equal to larger buildings put up two and three years ago.

Where larger and less modern homes are furnished with out-of-the-way sun porches, garden promenades and detached garages, the later type of small home has all such conveniences carefully worked into the limited ground plan in such a manner as to leave plenty of space for outside decorations. Instead of the "square" plan usually found in the designs of small dwellings, U-shaped and L-shaped buildings are now being erected, and the areas of free ground within the angles are being occupied by garden plots and shrubbery, greatly adding to the attractive appearance of the domicile.

Where formerly a distinct type of architecture marked the general design of the structure, builders are now combining the romantic lines of old Dutch, English and French styles with the smooth, simple walls of harmonized Spanish, Mexican and Moorish construction. By adapting the long French window to the sway-backed roof, squat chimney and turfed yard of the English manor house, a home is evolved that fits a small lot but gives an impression of being much larger than it really is.

Entire blocks of bungalows, no two of which are of the same design, have been built within ornamental walls which contain complete conduits for all wire and pipe necessary to carry required service of water, gas and electric current to the houses. This is only one of the methods employed by the architects to reduce the cost of construction and at the same time prevent exposure of anything that might detract from the neat beauty of the finished structures. The appearance of size and spacious surroundings is also furthered by the employment of built-in equipment in the interiors. Today, in some parts of the country, it is possible to get homes with kitchen, dining-room, bedroom, laundry and garage fixtures already provided, leaving only a few articles of furniture and personal needs to be bought by the owner. Kitchens in other labor and space-saving

Small House of English Design; Right, Toilette Cabinets Joined in Linen Closet
Left, Handy Kitchen Accessories That Open from Wall; Above, Cozy Concrete House with Rear Garage

Electrically Operated Home That Has Chimney Lines Filled by Graceful Peaks

Concrete House with Window Balcony Overlooking Lawn; Below, Novel Telephone Cabinet behind Panel
Convenient Breakfast Table That Forms Door of China Closet; the Bench Collapses beneath Window Sill

Flat-Roofed Home of Mixed Moorish and Spanish Model with All Rooms on One Floor

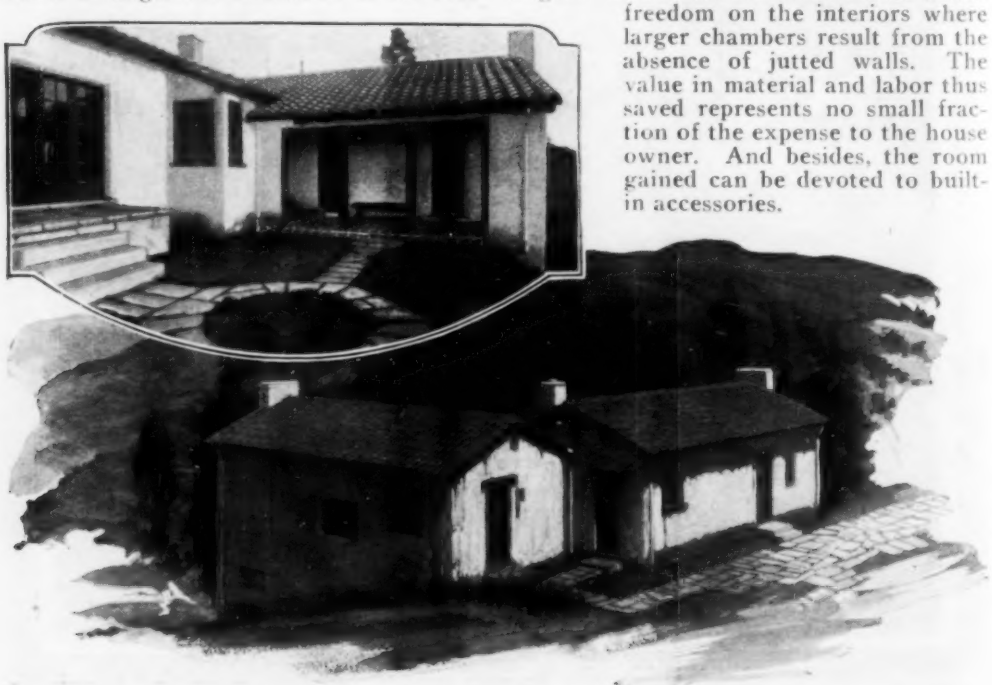
homes are furnished with tables and seats, accommodating several persons, which fold against the wall and are controlled by push buttons. When opened out, the table reveals a china closet handily arranged to care for the storing of the services and cutlery.

In the dining room, percolator, toaster, waffle iron and broiler are all carefully hidden behind elegantly finished walls and can be extracted in a moment and spread upon a table that folds against the side of the room until needed at meal time.

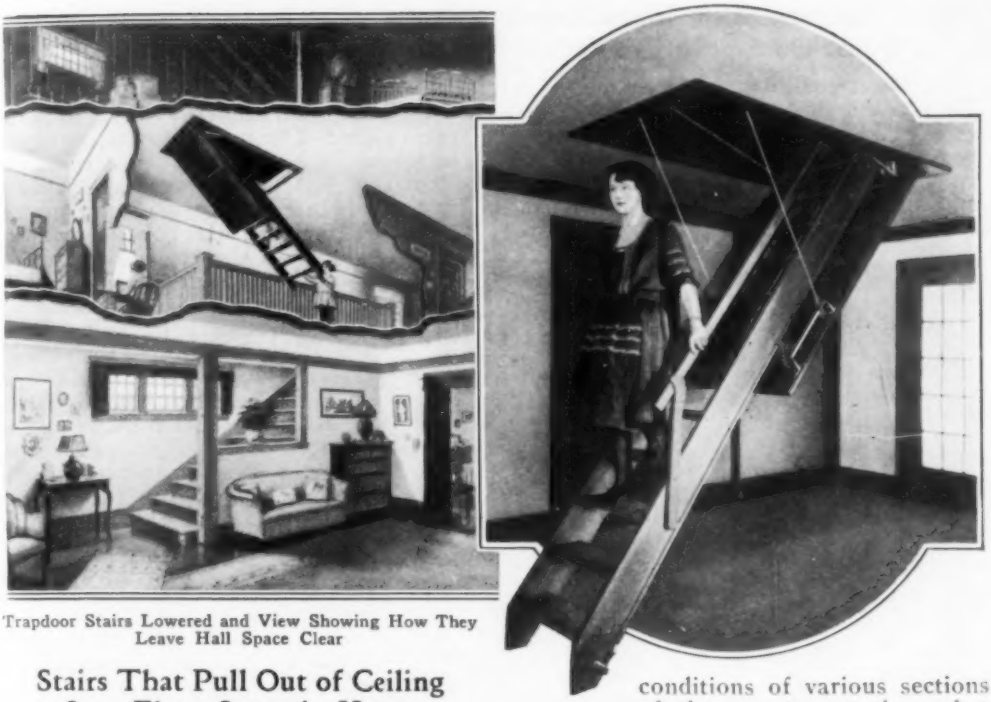
Despite the luxuries and conveniences that in recent years have been developed to assist the housewife and home owner, costs of homes provided with such improvements are said to be remarkably low. And in their use the occupants are relieved of the task of selecting and purchasing ordinary furnishings that would be required in houses not so equipped. Besides, there is more space available for various purposes. For instance, an entire case of shaving accessories can be inclosed in a small aperture in the wall of a bathroom. Merely by pressing a button or turning an ornamental latch, the device may be opened out and becomes a nicely arranged table on which all of the articles can be placed. Sometimes this appliance is combined with a medicine chest and the whole arrangement concealed in the rear of a mirror in the wall. Out of the door of a linen closet a shoe-shining stand can be made to open, and a wall heater with three heats is provided to keep the bathroom at any one of the temperatures desired. A series of electric push buttons in the bedroom controls the operation of the heater, so that the room can be made comfortable in advance of the hour at which it may be needed.

Outside the windows of such homes, miniature, yet perfect, gardens can be planted in inclosures that make it possible for the owners to enjoy the flowers on rainy days as well as in clear weather. Sun porches, built to extend back into the rear of the lot, may be surrounded on three sides with flowers and vines, making the backyards as attractive as the front lawns. Pleasing combinations of windows overlooking tiny balconies and ornamental doors opening upon narrow but graceful walks are planned to serve as convenient entrances as well as to harmonize the houses with their grounds.

With the introduction of electricity for heating and cooking in the household, dwellings are now being planned without chimneys on the roofs. In their place attractive gables and turreted peaks are built, allowing more space for storage purposes in small rooms that can be put under the angles. Elimination of flues leaves added freedom on the interiors where larger chambers result from the absence of jutted walls. The value in material and labor thus saved represents no small fraction of the expense to the house owner. And besides, the room gained can be devoted to built-in accessories.



Two Views of a Home of Unusual Mexican Design, Built of Flat, Hollow Tile and Concrete; Resembling Two Buildings, It Has a Large "Patio" and Three Fireplaces



Trapdoor Stairs Lowered and View Showing How They Leave Hall Space Clear

Stairs That Pull Out of Ceiling Save Floor Space in Home

Sliding stairs fitted to an overhead trapdoor so that they can be pushed up out of the way when not in use, have been designed to save floor space in hallways. When the door is opened by pulling down on a chain hanging within convenient reach, the stairway, supported by cables and attached to rollers, automatically slides to the floor. It is easily raised and pushed back again, and as it lies flat on top of the door, it takes up but little space in the attic. A handrail at one side insures safety, the steps are spaced at comfortable height and the stairs slant at an easy angle.

Big Underground Water Reservoirs Feed Springs and Wells

Feeding springs and wells with their subterranean supplies, pores, tiny holes and vast caverns in the solid rocks of the earth's crust, guard against water famines when rains are scant. These water-bearing openings are the result of processes that have been at work for ages. By careful study of the dip and slope of formations and the character of the rocks, drillers are often able to forecast the presence of water, and to assist them the United States geological survey has published more than 200 reports on the ground-water conditions of various sections of the country, stating what conditions are most favorable to its occurrence and furnishing other information valuable to the well digger.

Tractor Guided Like Wheelbarrow Takes Place of Switch Engine

Run by storage batteries, a small electric truck for switching cars and towing lighters on canals has proved successful in Germany. It is guided somewhat like a wheelbarrow with two long handles between which are the starting and control levers. The tractor has power sufficient to pull or push seven small freight cars.

Pulling a Freight Car with Electric Tractor Truck; Spring Bumpers Are for Pushing

Cubist Art and Sheet Metal Repair Quake Damage in Tokyo

In the rebuilding of the sections of Tokyo destroyed by the earthquake, oriental and western styles and materials are being combined. Nearly 1,000,000 buildings were destroyed but, according to an official report, not one structure of modern type was a complete loss. Impressed

Store Built to Replace Structure Destroyed by Quake, Showing Odd Trend in Architecture

by this fact, the Japanese have ordered vast quantities of improved building materials and have asked the assistance of many foreign engineers and architects. Many of the temporary buildings have been constructed in queer forms of sheet metal.

Huge Steam Locomotive Is Rival to Electric in Pulling Power

Supremacy in hauling railroad freight, claimed recently for an electric locomotive, is to be challenged soon with the introduction of a steam engine operating at 350 pounds' pressure and incorporating features of design upon which engineers have been working four years. It bears slight resemblance to modern engines. The smoke box is small and the boiler can scarcely be seen under a maze of huge steam pipes. The heating apparatus is of the marine type and the tubes carrying the circulation water are placed outside the fire box. Incased in extra-heavy asbestos, the tubes give the fire box an unusual width, so that it is only a few inches narrower than the cab, which itself is of the maximum width permissible for railroad use. The steam is admitted under high pressure first to the cylinder on one side and then passed, under slightly decreased pressure, to the cylinder on the opposite side, larger in diameter to produce the same power. It then is exhausted through the stack. A pair of small forward wheels are followed by four drivers but the usual trailers are missing, the idea being to concentrate the weight to provide greater traction. The usual "booster" is attached to the forward truck of the tender. Steam is carried through steel pipes to this, which, with its small wheels and consequently lower gearing, is used in starting the train, after which the pressure shuts off automatically. Greater efficiency in freight haulage at less expense than the average engine is claimed for the locomotive.

Sleepless Surgery Is Predicted

Prediction that a majority of surgical operations of the future will be performed while the patient is conscious, was made before a recent medical convention. By "blocking" the nerve group that controls the part of the body to be operated upon through the agency of a local anaesthetic, it was said that pain would be eliminated without the necessity of putting the patient to sleep. Considerable research work in nerve blocking has already been done, it was declared, and certain major operations have already been performed.

¶With a dial fifty feet across, the minute hand twenty-seven feet six inches and the hour hand twenty feet long, a clock that, it is believed, will be the biggest in the world is being made for a Jersey City factory; the two hands will weigh a ton.

Surveyors Battle Snow and Cold to Locate Mountain Road

Battling stiff gales and plunging through deep snowdrifts at sub-zero temperatures, a party of five surveyors fixed the location for the Warren G. Harding highway, a continuation of the Mt. Evans road, high among the Colorado Rockies. At times, the wind blew so hard that two men were required to hold the level rod. Four-feet stakes frequently were used because of the depth of the snow. Several trips were made over perilous country for supplies and sometimes the men were tied together like Alpine climbers. In all, the party ran a line twenty-five miles long with a maximum grade of six per cent, dropping 5,000 feet in elevation. One of the difficulties of the task was finding the location for three tunnels that are to pierce great rock bluffs, 1,500 feet high, above a lake.

When Snow Banks Were Encountered, the Pack Horses Needed Aid

Digging Their Way through Deep Drifts, Surveyors Planted Their Transit on Wind-Swept Summits to Mark Path of Highway

Invisible Wire Gauges Strength of Electric Currents

Strands of wire so fine that they can be seen by the naked eye only as they reflect a streak of light are now being manufactured from tungsten and copper-nickel alloy for the tiny filaments that measure minute alternating currents. It would take 100 of them to make the thickness of a single human hair, some of them being only one five-thousandth inch in diameter. A microscope is needed to aid in handling them. The tungsten or alloy is first drawn through dies made of pierced diamonds and then eaten down to the desired size in an electrolytic bath.

Pupils and Teacher about Group of Sand-Box Settings from the Operas

Fashioning a Lovers' Forest by Sticking Real Sprigs in Sand

Wooden Blocks for Pyramids Added Realistic Touch to "Aida"

Gingerbread House and Fantastic Ballet of Tiny Dolls in Lively Poses

Sums and "Three R's" Forgotten in the Fascination of Modeling Music

Gingerbread Operas Help Pupils in the Study of Music

By staging miniature replicas of operas in gingerbread, ballet suites in sand with doll dancers and interpreting Verdi and Mendelssohn in rags, pasteboard and colored paper, grade-school children of Cicero, Ill., have made a game out of the study of music.

The plan was devised primarily to assist the pupils in a music-memory contest and in their study of English. Instructors explained the idea, but the children did all the work on the models, which were constructed and arranged in the schoolroom sand boxes.

Tiny electric-light globes added to the realism of the miniature stages. Bricks painted on paper and red lamps reproduced the effect of a burning castle. Stores were ransacked for cheap dolls of all descriptions, and even the boys took delight in helping to costume them. Pyramids were devised of rough blocks of wood, sprigs were placed in the sand to represent a dense forest and a gingerbread house was roofed with cookies.

Two-Pronged Puller Removes Corks without Breaking Them

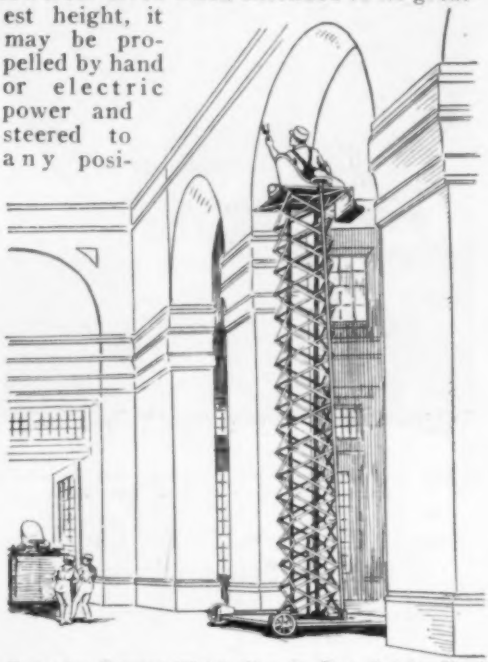
Corks are pulled easily, and without breaking or jamming them into the bottle, by a small handle to which are attached two narrow, grooved spring prongs. These are inserted between the cork and the neck and a twist withdraws the stopper. The prongs may be bent in or out to fit bottles of different sizes.

Easy to Start an Avalanche

Avalanches have sometimes been started by trivial causes. The tinkle of sleigh bells or even a whisper, has been known to set them off in the Alps, and many lives have been lost by a climber shouting to his companions. Several years ago, a caravan of sleighs was overwhelmed by a sliding mass of snow and ice, supposedly started by the sound from the bells. Thick stone barriers have been erected high on the mountain slopes to protect travelers.

Extension Platform on Wheels Is Run and Steered by Worker

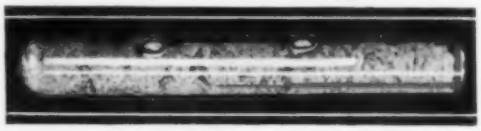
So that work may be done at an inaccessible elevation without the building of a scaffold, a vehicular extension support has been patented. It consists of a platform on wheels which may be easily raised or lowered. Even when extended to its greatest height, it may be propelled by hand or electric power and steered to any position. Collapsible when not in use, it occupies little space.



Extension Support Which May Be Propelled by Hand or Electric Power to Any Desired Spot

Cigar-Shaped Humidor of Glass Fits in Box with Smokes

To keep cigars fresh and moist, a small glass humidor, the size and shape of a cigar so that it will fit the box, has been placed on the market. It will also prevent cigarettes and tobacco from becoming dry. The tube is filled with a preparation similar in appearance to mineral wool. The contents are kept moist by dropping water into two holes in the humidor about once a week.



Glass Humidor Shaped Like a Cigar That Fits in Box to Keep Tobacco Fresh

Copyright, Keystone View Co., Inc.

Combination Tennis-Racket Press and Seat Attached; Note Wire Legs Folded on Handle

Tennis Racket with Folding Legs Becomes Seat for Player

Tennis players who have to wait for courts will be aided by a racket press that can be used as a chair. The sides are formed by the back and seat which clamp on each side of the frame. In carrying, the legs are easily folded out of the way.

Volcanoes Yield Fortunes

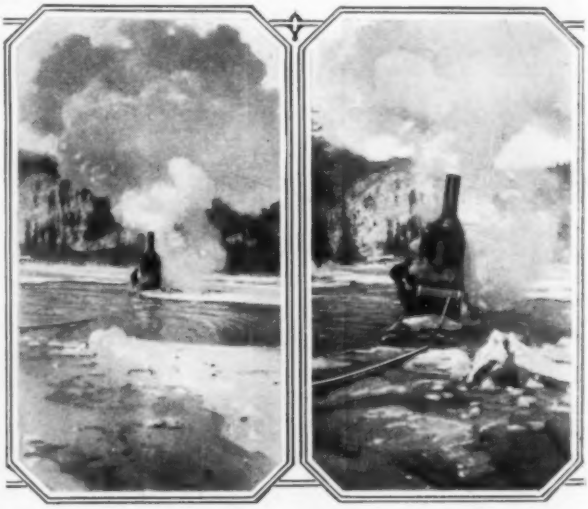
Volcanoes are said to have yielded sizable fortunes to Italians who have built factories around the craters to obtain commercial by-products. Boric acid is one of the most important of these. Ammonia is also present in sufficient quantities to permit its separation at a profit. The volcanic region near Naples bubbles and seethes with smoke and fumes. If the gas of any of the small craters is ignited, puffs of smoke appear in a dozen places on the surrounding hills. Over a large area, the ground gives a hollow sound when tapped with a cane as it is only a relatively thin crust under which is a veritable inferno.

Coke Dust Is Pressed into Blocks as Substitute for Emery

To replace emery by coke dust pressed into blocks, is the idea of an English inventor. It is said that sufficient quantities of the material can be drawn from the thousands of tons of coke dust annually wasted in by-product plants. After the dust is collected, it is milled into flour of varying degrees of fineness, mixed according to a secret formula so as to form a thick paste and then pressed into blocks of convenient size.

"Donkey" Engine Attached to Cable Pulls Itself across River

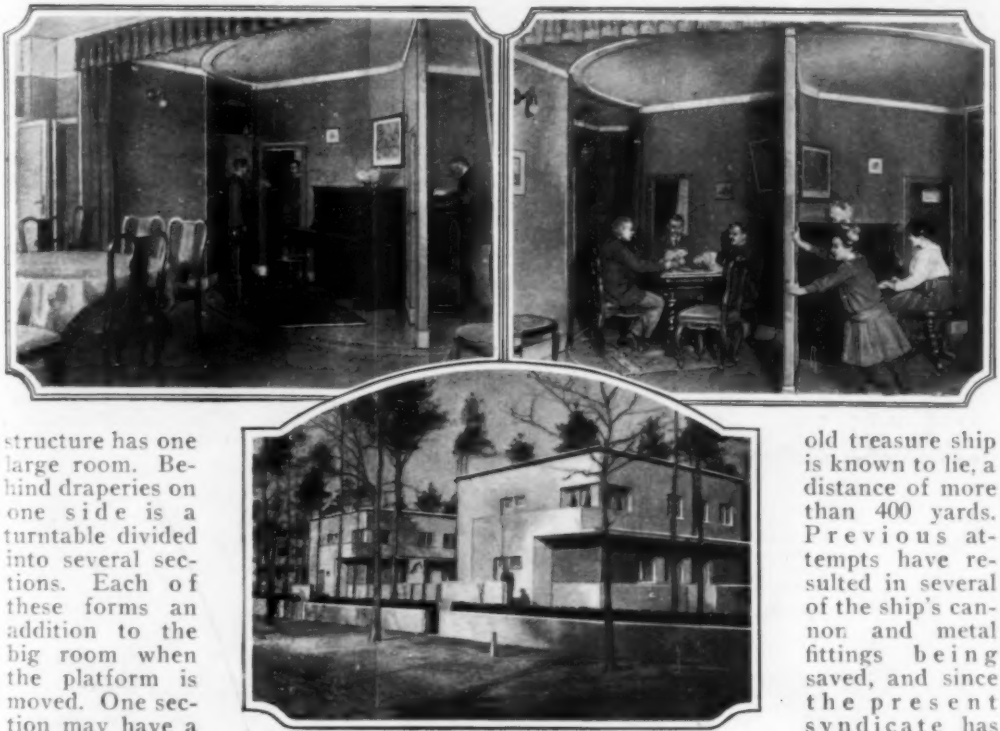
Working against the odds of a sub-zero temperature and water that threatened to extinguish his fires, an ingenious and plucky engineer in northern Idaho rigged his "donkey" logging engine to pull itself across the St. Joe river. A cable, run through a pulley block on the opposite side, was attached to the engine at the winding drum. Then the donkey, securely fastened to a log raft, was fired to 150 pounds' pressure and moved across the ice by applying power to the drum. Luckily for the engineer, the river was only four feet deep at a point where the "steamer" left the ice, for water flooded the fire box and only by sticking steadfastly to his post, was he able to put the engine across the stream. He finally arrived at the opposite bank with only ten pounds of steam.



Snaps of the "Donkey's" Gallant Voyage across the St. Joe River; Clouds of Steam Arose When Water Reached the Fire Box

Turntable Rooms to Help Save Space in Homes

Several different rooms may be made from one in a turntable house built in Germany. Each floor in the two-story structure has one large room. Behind draperies on one side is a turntable divided into several sections. Each of these forms an addition to the big room when the platform is moved. One section may have a piano, another a card table and a third a kitchen. Doors are placed at convenient intervals.

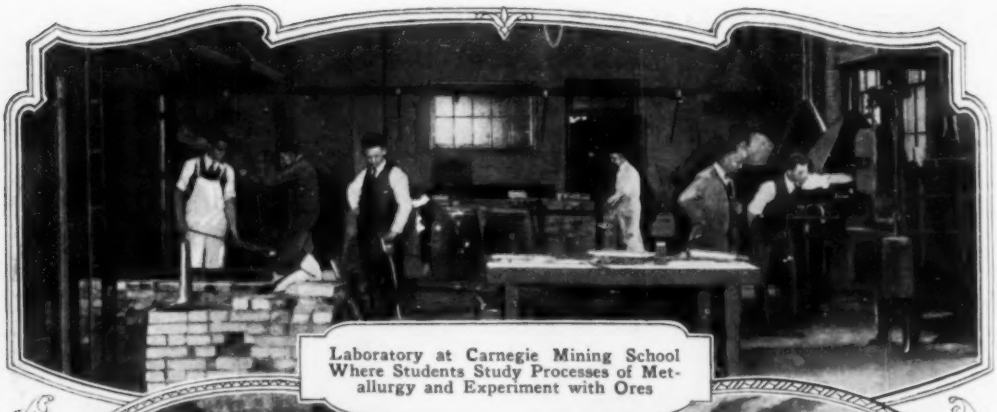


Exterior and Interior Views of Unique German House Showing Rooms Built on Turntable

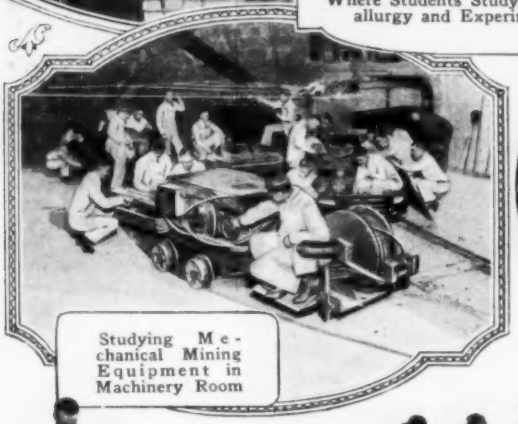
Tunnel under Ocean to Treasure Ship Wrecked Centuries Ago

One of the most romantic treasure hunts ever undertaken is being made on the Pondoland coast, S. E. Africa. During the latter part of the eighteenth century, an English-owned sailing ship, the "Grosvenor," was wrecked on the Pondo coast while homeward bound. The cargo, which consisted of gold and silver in bars and coin, was valued at $12,000,000 in those days. Several attempts have been made since at salvage, but owing to the wreck being close to the line of enormous breakers, no vessel can safely anchor on the spot near enough to be of any use. It has been ascertained, however, that the hull, which is believed to be still intact, lies in a rocky gully covered to a great depth by sand, and a syndicate of Johannesburg mining engineers has devised an ingenious method of obtaining the treasure. A spot has been selected on the shore and from it a tunnel is being driven down through the solid rock of the sea bed to the gully where the old treasure ship is known to lie, a distance of more than 400 yards. Previous attempts have resulted in several of the ship's cannon and metal fittings being saved, and since the present syndicate has been on the spot, gold coins and articles of jewelry have been found in the sand of the seashore or have been obtained from the natives. Apart from the enormous wealth known to be in the "Grosvenor's" cargo, it is reported that many of the passengers who were lost with the vessel, were merchants on their way back to England with fortunes in jewelry that they had amassed during a lifetime in the Indies. In connection with the wreck, when the first white explorers penetrated Pondoland, about a century ago, it is said light-colored people were met with. These were supposed to be descended from the passengers of the wrecked ship who escaped with their lives only to be taken prisoners by the savages.

¶About 8,000 electric locomotives for mining and industrial service have been built by the General Electric company since the firm began making engines, almost half of them in the last eight years.



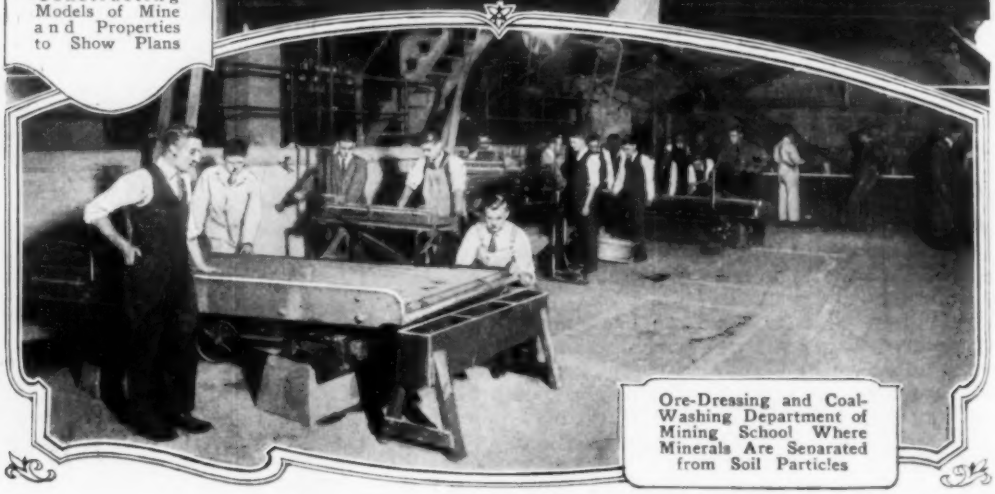
Laboratory at Carnegie Mining School Where Students Study Processes of Metallurgy and Experiment with Ores



Studying Mechanical Mining Equipment in Machinery Room

Getting Knowledge of Drills and Their Uses by Operating Tools in Mine

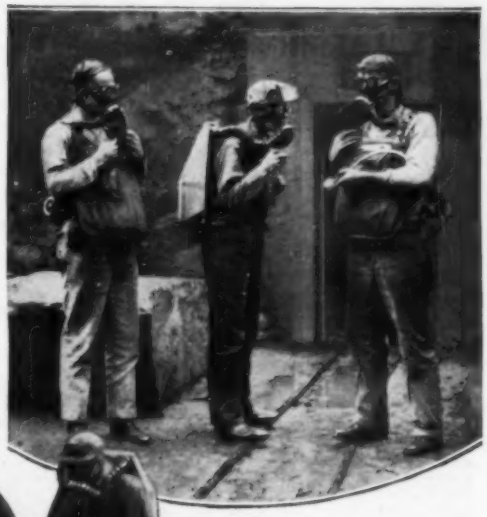
Constructing Models of Mine and Properties to Show Plans



Ore-Dressing and Coal-Washing Department of Mining School Where Minerals Are Separated from Soil Particles

Mine-Engineering Students Study Underground Rescue Work

To prepare students in the mine-engineering school of the University of California for aiding and directing first-aid and rescue crews during mine disasters, a course composed of such study and practice is given them. Drills are held in which the pupils, equipped with pulmotors, stretchers and gas masks, go through the processes of rescuing and reviving victims of accidents underground. Tours through neighboring mines are made by classes of the Carnegie Institute of Technology school of mining to acquaint them with the nature of subterranean surroundings and to teach them handling of tools and machinery employed.



Students in Mine-Engineering Holding Rescue Drill under Conditions Similar to Those Met during Disasters; Above, Group Equipped to Enter Mine Prepared in Imitation of Rock-Filled Chambers and Passages That Confront Searchers after Explosions or Cave-Ins Occur in Workings

Lost Art of "Unbreakable" Glass Is Revived in Germany

"Unbreakable" glass manufactured from quartz, is being used in Germany for various scientific purposes in chemical and electrical laboratories and for melting pots, tubes, clubs, flasks, and many other articles. It is said to have twelve times the durability of ordinary glass, and because it contracts and expands but little under extremes of temperature, it is well adapted for various kinds of scientific experiments. The quartz is melted in special apparatus under 2,000 degrees Centigrade with the aid of an oxyhydrogen flame and treated to give it its extreme hardness. Unbreakable glass is said to have been discovered in the days of the Romans, but inventors of the process were put to death or their laboratories were demolished so that their product would not detract from the value of metals.

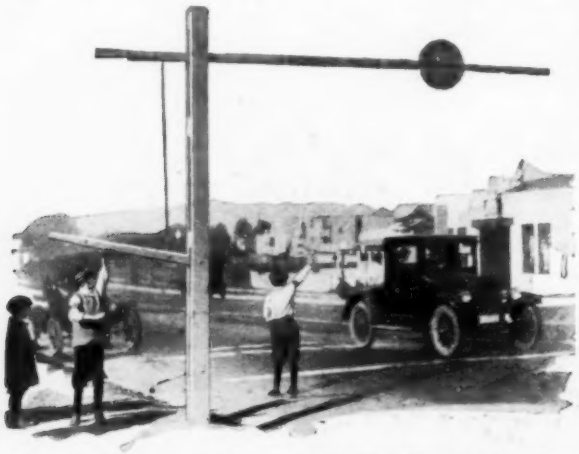
Pair of Tongs for Use in Scientific Laboratory with Ends of "Unbreakable" Glass

Cast-Off Auto Bodies Sunk in River to Hold Bank in Place

For temporary protection of a river bank being undermined by floods and strong currents, approximately 2,000 discarded automobile bodies were sunk in depths of from twenty to forty feet. Placed in a barrier along the shore line, the cast-off vehicle hulks formed a "mattress" to hold the land from slipping into the stream. Many that did not readily submerge were filled with rock. It is said that the plan checked erosion of the bank, until permanent dikes could be installed.

Safety Gates and Boy Traffic "Cops" Guard Lives of School Children

Automobile stop signals, somewhat like safety gates at railroad crossings, have been installed near schools in Berkeley, Calif., to protect the lives of children. In addition to the long crossbar sign, which is placed high above the street and is raised or lowered by a lever at the side, a wide white line and the words "School, Slow" have been painted on each side of the intersections on the pavement as additional warnings. During hours when children are on their way to and from school, boy traffic "cops" are stationed to operate the signal gate and to halt automobiles that may disregard the warning signs.



Schoolboy Policeman Halting Motorist Who Has Run Past Stop-Signal Safety Gate at Crossing

Forestry Offers Field for Skilled Workers

While forestry in the United States has been practiced for a period of only twenty-five years, within that time it has advanced greatly and has been developed into a business as well as a profession. It has many practitioners and there are also now engaged in it concerns that will do any kind of forestry work, from the care of a single tree to the development and protection of extensive tracts. The up-to-date foresters also undertake to make orchards profitable and the economical handling and development of timber lands. They will plant trees, will reforest cut-over or burnt-out tracts, or provide forest cover wherever it may be desired, as for watersheds. They will establish and, if desired, operate a system of fire protection and take charge of the trees of a village or a city. In these days, more and more private owners avail themselves of the services of the professional forester and there is an increasing demand for his assistance among lumbermen and others handling trees in a large way. There are also more and more owners with holdings covering hundreds of thousands of acres who are working their properties on modern forestry lines.

Three-Car Surface-Line Trains Speed Traffic

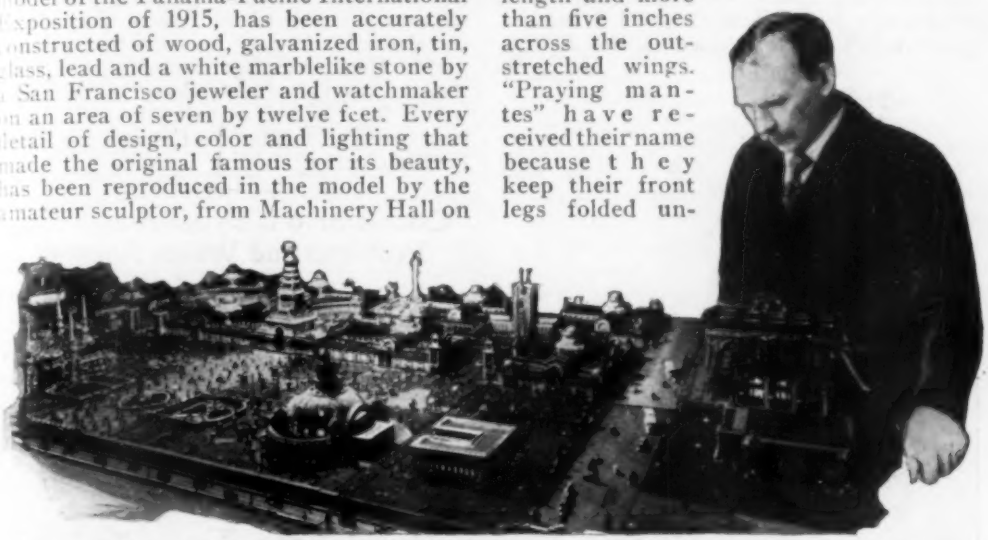
Three-car surface-line trains have appeared in Detroit on one of the busiest thoroughfares in the city. They are composed of vestibuled cars to permit passengers to go from one to the other and each car has wide center doors for entrance and exit. A crew of only two men operates the entire train, and it is said to have proved efficient in rounding sharp corners and in passing through crowded streets. The cars are strongly built and light in weight, and have two sixty-horsepower motors, one on the front and one on the rear trucks.

One of Detroit's Three-Car Surface-Line Trains, Used on Busy Streets to Speed Up Rush-Hour Traffic

¶Twice as many victims are claimed annually by man-made electricity as by nature's lightning.

Exact Miniature of Frisco Fair Takes Eight Years to Build

Wired for day and night illumination, a model of the Panama-Pacific International Exposition of 1915, has been accurately constructed of wood, galvanized iron, tin, glass, lead and a white marblelike stone by a San Francisco jeweler and watchmaker on an area of seven by twelve feet. Every detail of design, color and lighting that made the original famous for its beauty, has been reproduced in the model by the amateur sculptor, from Machinery Hall on the east and the Palace of Fine Arts on the west, to the people, flowers, trees, wheel chairs, trains, electroliers, automobiles, horses and turnstiles at the entrances. The telegraph poles and wires and the city street-car lines are shown outside the wall. When illuminated, the same sparkling effect that marked the Tower of Jewels as one of the wonders of the fair, is produced in the miniature. Other lights, flooding through glass domes, windows and open doors of palaces and halls, are reflected in the water of the Fine Arts lagoon in which small, live goldfish have been placed. Aided by sketches, drawings and photographs, the jeweler worked for eight years to complete his model.



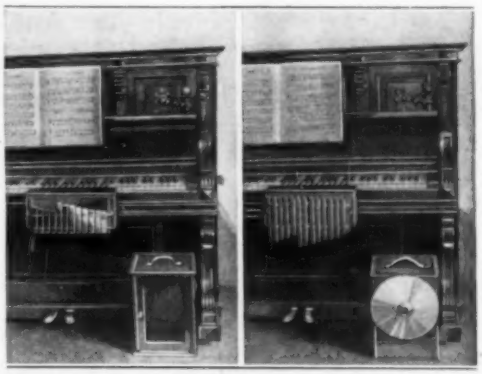
Amateur Sculptor with Exact Model of the Panama-Pacific International Exposition He Constructed on an Area of Seven by Twelve Feet after Working for Eight Years

Chinese Insect Imported to Fight Farm Pests in South Dakota

To combat the grasshoppers, caterpillars, crickets, flies and the host of other pests that annually cause huge losses to farm and orchard crops in South Dakota, mantes—distant relatives of the grasshoppers—have been imported from China. The insects capture and devour the destructive pests but will not attack any crops grown in the state nor do harm to man, farm animals or birds. Egg masses for propagation purposes are to be placed in different sections under the direction of the state entomologist. As the mantis increases in size, it feeds on larger and larger insects. When full-grown it is winged and measures almost four inches in length and more than five inches across the outstretched wings. "Praying mantes" have received their name because they keep their front legs folded underneath their "pious-looking faces" as if in prayer. These legs are very spiny and are used to hold any insect which may be seized.

"One-Man Orchestra" of Four Pieces Played by Keyboard

Xylophone, chime and cymbal accompaniments can be played with a "one-man orchestra," the attachments of which are fitted to the piano keyboard and under the instrument. They are operated by the player's left knee and right foot.



Xylophone, Cymbal and Chime Attachments in Position for Pianist to Play with Piano

Tiny Dishes for Queen's Doll House Show China Maker's Skill

Tiny dishes, so small that a whole set can be placed easily in a woman's hand, were made by an English pottery for the queen's doll house, shown at the British Empire exhibition at Wembley. The gold-band, Greek-key pattern is said to have been selected by the queen herself, and every piece down to the minute egg cups, less than a quarter of an inch high, bears the royal monogram. The set is made from the highest grade of china and modeled after dishes of ordinary size.

Exquisitely Monogrammed and Figured, These Tiny Dishes Adorned Queen's Doll House at English Exposition

Cigar Lighter That Fits in Any Auto Can Be Worked with One Hand

Designed so that it can be attached quickly to the instrument board of any automobile, a simple cigar or cigarette lighter has been placed on the market. Within a flat metal bracket there is a heating coil which becomes red-hot in a few seconds when contact is made by pressing a small button. Current is automatically switched off when the button is released. It may be worked with one hand. Contact and ground wires are easily attached and the lighter has a curved shelf below for a holder or ash tray and to prevents sparks falling on the car carpet or on the clothing.

By Pressing Button with One Finger, Cigar Is Lighted Quickly against Heat Coil

Calculator on Typewriter Solves Problems and Writes Answers

Algebraic problems, computation of foreign exchange, discount, interest, multiplication, addition, subtraction and many other similar mathematical problems are solved almost miraculously on a typewriter by a calculator that is geared to the machine. With the device it is said that, in writing bills, the correct total prices for each and all of the articles will be shown instantly, and that bookkeeping and similar work can be done, all without a second operation on an adding machine. When the typist has finished copying something, such as an invoice or statement, the keys automatically tap off the answers on the same sheet of paper, with all of the subordinate problems correctly solved. Addition, multiplication or subtraction is performed as each line is finished, the answer appearing in the proper column. Then at the end, the debit and credit items are summed up by the calculator without any further action on the part of the operator. If the result is a credit, the answer appears in red. One of the accomplishments of the machine is said to be its ability to instantly compute foreign exchange. Any sum in pounds, shillings and pence, francs, lire or marks may be instantly translated into the equivalent in United States currency by merely typing the amount and the exchange rate.

Sowing Timber Crops to Save Nation's Trees

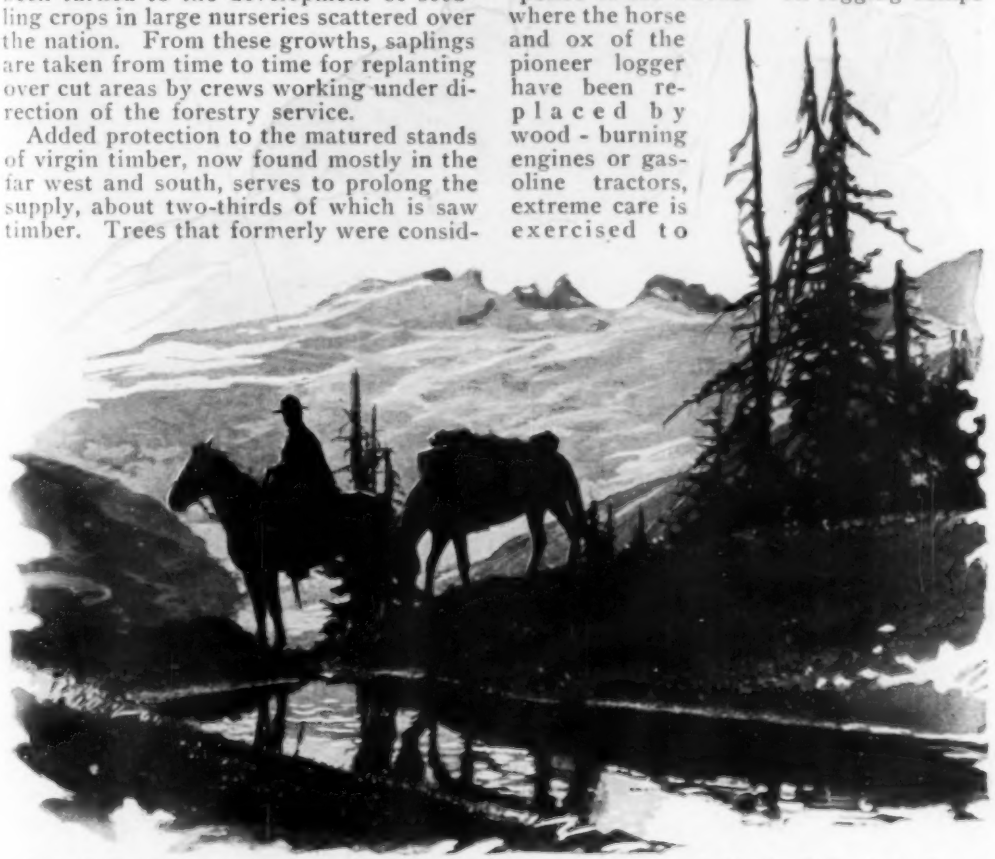
Loggers, Rangers and Government Experts Unite to Guard and Replace Virgin Forests of the Lumberlands

SEEKING to conserve and replace the rapidly disappearing forests of the nation's timberlands, government experts of the forestry division are raising millions of young trees to take the place of those felled for industry or consumed by destructive fires that yearly sweep their tolls from the wooded areas.

While the present timber stands of the United States are estimated at 463,000,000 acres, this figure represents but a little more than half of the original lumber resources of three centuries ago when settlement of the territory first began to make inroads on the forests. With the constant demand for lumber stirring the industry to renewed efforts to supply sufficient material for the country's needs, attention has been turned to the development of seedling crops in large nurseries scattered over the nation. From these growths, saplings are taken from time to time for replanting over cut areas by crews working under direction of the forestry service.

Added protection to the matured stands of virgin timber, now found mostly in the far west and south, serves to prolong the supply, about two-thirds of which is saw timber. Trees that formerly were considered of little or no value in the lumber industry have been utilized for profitable purposes solely through the efforts of laboratories established to find ways in which such growths could be used as substitutes for more valuable trees.

Through the watchfulness of the forest rangers, who patrol the thickly wooded regions night and day in search of smoldering fires or conflagrations set up by lightning, millions of dollars' worth of trees are saved from destruction. Campers entering these territories are cautioned as to dangers that lurk in the carelessly tossed firebrand or cigar end, and thousands of blazes caused by lack of forethought on the part of sojourners in the summer-dried forests, are subdued each year by the "police of the woods." In logging camps where the horse and ox of the pioneer logger have been replaced by wood-burning engines or gasoline tractors, extreme care is exercised to

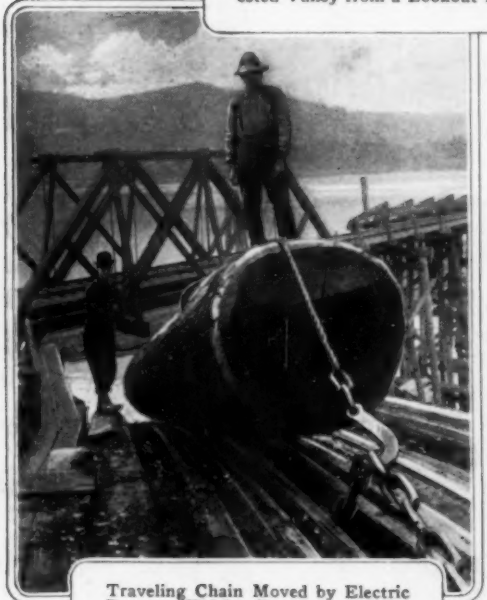


Through Rough and Dangerous Country and over Jagged Mountain Ranges Lie the Trails of the Ever-Watchful Forest Rangers Who Guard the Nation's Forests from Fire

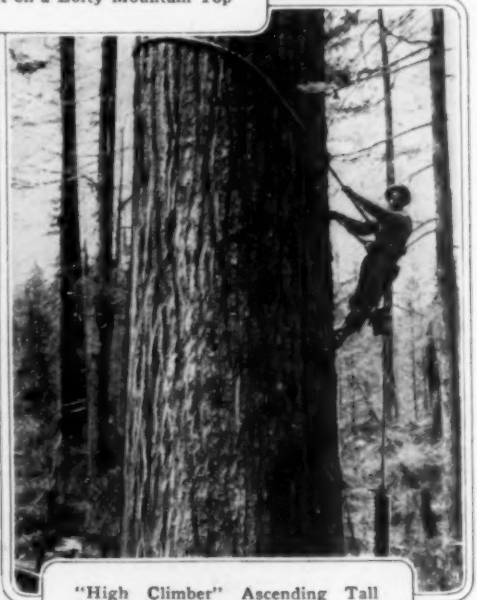
Taking Lockers of Fire-Fighting Tools to Their Places in the Woods Where They Can Be Easily Reached

Forest Ranger Making Boxes to House Wild Birds among Big Trees They Help to Guard from Insect Pests

"Guardian of the Trees" Taking an Observation of a Forested Valley from a Lookout Post on a Lofty Mountain Top



Traveling Chain Moved by Electric Power Which Transports Logs along Steel Skidway



"High Climber" Ascending Tall Spar Tree to Be Trimmed for Support of Aerial Cable

Old Days in the Lumberlands, When Caravans of Plodding Oxen Dragged the Huge Logs to the Skidways; "Gas" Tractors, Donkey Engines and Narrow Railways Now Handle the Fallen Giants of the Forest on Cars or Aerial Cables

prevent sparks and dripping oil from endangering the tinderlike vegetation and the safety of the workmen. More than he fears the falling giants of the forests that sometimes crash unheralded under the ax of the chopper into the midst of a toiling crew, the woodsman dreads the curling wisp of blue smoke that warns him of the presence of fire. And it usually means a loss of acres of big trees matured after years of steady growth, unless quickly subdued. While engineering science aids the loggers of today in harvesting the stands in remote fastnesses or at the tops of high, steep mountains, only by studied regard for the younger shoots is a future crop assured. With motors and tractors supplying power for transportation and the barking donkey engine performing the task of "shooting" the trimmed logs to the temporary railroads that often lie far down a hillside, less damage is done to surrounding trees than in the old days of rolling or dragging the weaving loads through the woods. Spirelike spar trees selected for their convenience to the scenes of action are trimmed by adventurous "high climbers" into tall bare masts that support moving cables from which the speeding logs swing as they race downward to the loading place or sawmill. Hanging from the traveling line, their departure from the choppers' position is announced by shrill warning blasts of the "donkey's" whistle and, brushing noisily through the foliage lining the pathway, they race along the aerial track. Though there are few scenes of more utter desolation than those offered by wide areas of logged-off land where great stretches of jagged debris mark the spots once occupied by splendid trees, the problem of replenishing the waste with valuable timber is being met to a great extent by tireless efforts of those struggling against a constant harvest that goes on at a rate four times as fast as the majestic woods can grow.

Although many immense tracts of virgin timberland still remain untouched by the woodsman's saw, it is only a question of a few years when they will be invaded by crews of bustling swampers and choppers.

Hardwoods have been scarce for a long time and so great is the shortage of well-seasoned lumber such as walnut, cedar and similar woods that dealers go about some parts of the country buying up old barns and farm buildings merely to salvage the valuable heavy timber they contain. One concern is known to make a practice of purchasing fences constructed from cedar rails, often replacing them with modern inclosures of the steel-wire variety as an inducement to the owners to sell them.

Cutting a Fire Line across the Path of a Forest Blaze to Stop the Spread of Creeping Ground Flames by Clearing Away Dry Brush on Which They Feed

School Children, although Cripples, Model Statues from Memory

Although handicapped by crippled bodies, several children in a Chicago school have shown considerable skill in modeling small statues from memory after visits to the Art Institute. Returning to their classrooms, they strive to reproduce in clay replicas of the works of the great masters. Guided only by their mental notes and by a suggestion now and then from an instructor, their deft fingers fashion groups and single pieces that are said to show remarkable fidelity to the originals.

Copyright, Underwood & Underwood

Two Youthful Sculptors Whose Models Show That Skill and Good Memories Can Conquer Handicaps

Stainless Iron May Replace Steel and End Ravages of Rust

To do away with the tremendous waste caused by the ravages of rust and eliminate the necessity for painting steel bridges and other structures to prevent their rotting away, a process has been developed for making what is known as stainless or rustless iron. It is said to be somewhat newer than stainless steel, which is suitable almost exclusively for cutlery and surgical instruments. Rustless iron, however, is a material which can be rolled or formed into a great many different shapes. It is essentially an alloy of iron and a metal known as chromium. Considerable pioneer work has been done on the product in Great Britain. Quite a number of ocean liners are being equipped with electric fans, hardware of many kinds, frames for grates and any other objects exposed to the corroding action of the sea air, as one advantage claimed for the metal is that it maintains a brilliant polish similar to silver under all conditions and does not need reburnishing. In America it is proposed to manufacture the stainless iron on a large scale, making pipe, sheets, bridge material and other forms. One element which has interfered with the wide introduction of the metal is the cost of chromium, but it is believed that this will ultimately be overcome.

Disinfecting Troughs for Autos to Stop Cattle Plague

To prevent automobiles from spreading the dreaded hoof and mouth disease in California, disinfecting troughs have been constructed alongside roads in a section visited by the plague. After passing through the infected area, cars are halted by officials and the drivers ordered to run them through the troughs, where a chemical bath cleanses the tires and wheels.

Running a Car through Disinfecting Trough to Kill Germs on Tires and Wheels

Copyright, The (London) Times

Marvelous Photograph of Scene on Ordinary Illuminated Stage, Taken during Action by Camera Equipped with Remarkable Speed Lens That Needs No Flashes or Searchlights to Record Detail

Indoor Snapshots Made Possible by High-Speed Lens

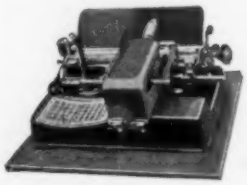
Without the aid of searchlights or flashlights, actual snapshots of stage scenes have been taken under ordinary conditions of light with a camera speed lens having an unusually large opening. Said to be five times as rapid as the fastest lens formerly used, it can reduce such exposures to one-fifth the required period, and the resulting picture may be greatly enlarged.

Even where confronted with fast action, a camera equipped with the lens can record the photograph so quickly as to show no trace of motion in an enlargement of the subject. Where exposures of several seconds have been necessary to take pictures which registered very little of the finer detail, the new lens records them in less than one-tenth the time, and preserves the features ordinarily lost by the other types. In taking theatrical groups with the usual stage lighting, specially sensitized plates were employed, which made it possible to obtain fully exposed negatives with exposures of one-tenth of a second.

Other interior uses where the lens is expected to prove of great value are home photography, in which lighting conditions are seldom found suitable to rapid and finely detailed camera work; for surgical operations and in the study of minute subjects that cannot be highly magnified. It has also been said that aerial photography can be made more valuable through the taking of night views, especially under war-time conditions when fortified areas would be unapproachable in daylight. Astronomers, too, it is pointed out, will be able to profit by the new lens, which is known as "The Taylor-Hobson Series O," when making star survey charts, by greatly reducing the time of exposures.

Typewriter Minus Individual Keys Is Operated by Pointer

Typewriters without individual keys, that are said to permit greater speed and lessen the chances of mistakes for beginners, are being manufactured in France. On the left of the machine is a table of characters and a free-swinging pointer or stylus which the operator moves to the desired letter. Simultaneously the right hand presses a lever in front which causes a cylinder to print through the ribbon. The pointer governs the rotation, advance and retreat of the cylinder. Perfect alinement is given and it is said a speed of 200 to 300 characters a minute is possible. It is also claimed that the typewriter has fewer parts than the standard machine. Made of aluminum, it weighs only fifteen pounds.

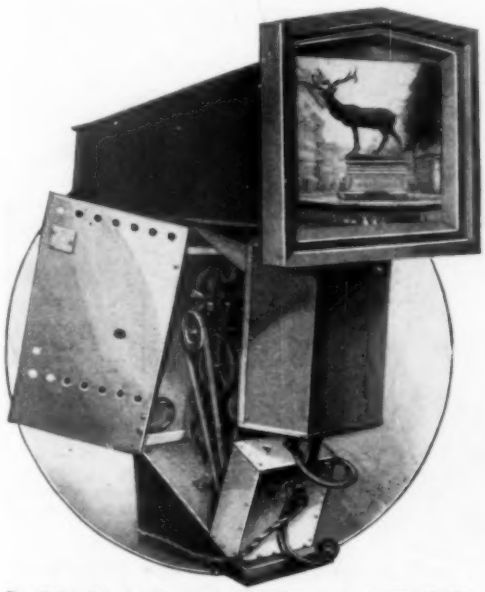


Mt. McKinley Sinking Two Feet Every Year, Is Claim

Mt. McKinley, highest peak on the American continent, sinks about two feet each year from its altitude of 20,300 feet, according to residents in the vicinity. They declare that there is an average of four earthquake shocks annually, and contend that with each tremor, the mountain settles about six inches. To confirm their belief, they refer to the Aleutian islands. According to scientific reports, no one can state the location or altitude of many of the small islands in the group, as a body of land may appear well above the water one day and under it the next.

Daylight Motion-Picture Film Reruns Automatically

Fitting compactly within a small suitcase, a daylight motion-picture projector has been invented especially for advertising purposes in show windows. It is run by an electric motor, and the film is rewound automatically and shown again, giving a continuous performance without the attention of an operator. The entire outfit folds together, occupying little space. The screen is twelve by sixteen inches.



Daylight Movie Camera with Screen and Hood Adjusted; Whole Outfit Folds into One Package

New Nose on "Shenandoah" Fits Ship for Further Sky Voyages

By putting a new nose on the "Shenandoah" and making a few other repairs, damage done when the gigantic dirigible tore loose from her moorings, some time ago, was quickly mended, and the ship was pronounced ready for further voyages. To replace the parts torn away from the framework when the ship was wrenched from her anchorage, light aluminum girders and plates were riveted on, the ripped fabric was taken off and freshly painted and stitched widths put on. The accident, according to engineers and navy officials, demonstrated the solidity of the ship, as little damage was done to any other part.

Copyright, Kadel & Herbert

Putting Finishing Touches on "Shenandoah's" Tip and Mooring Coupling That Holds It to Mast

Panama Gun Hurls a Ton of Metal over Thirty-Five Miles

Uncle Sam's latest weapon of defense—a sixteen-inch gun for the fortification of the Panama Canal—has a range of approximately thirty-five miles. About seventy feet in length, it will fire a shell or bullet weighing a ton. The powder charge totals 750 pounds. The barrel is made of specially treated steel tubing wrapped with miles of piano wire. Over this a metal shell is shrunk after being heated to cause its expansion. The life of such a piece is comparatively short, the rifling being destroyed by the force of the charges necessary.

Reclining on Spikes, Young Girl Withstands Blows upon Anvil Supported on Her Chest

Girl Held on Spikes by Anvil Is Unharmed by Hammer Blows

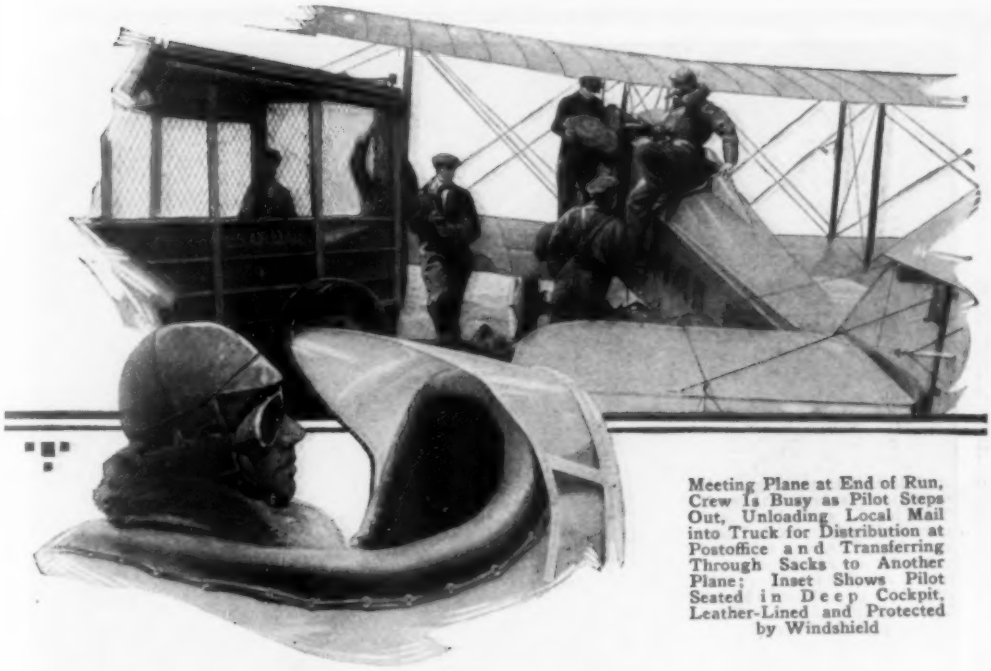
Lying on a board filled with six-inch spikes, a young Italian girl allows two men to strike sledge-hammer blows on an anvil resting on her chest. The spikes are driven closely together and are of equal height. Most of the force of the blows is spent on the anvil, although the young performer is careful to distribute her weight equally and brace herself against slipping to an angle where the sharp spikes would pierce her. Nevertheless, the act is sufficiently hazardous to provide a never-failing thrill.

¶Cut with wedge-shaped tongues and grooves, a style of flooring has been invented to permit great economy in lumber. The wedge is said to draw the boards more tightly and the bulk of the wood is left above the joint where it is available for use when nailed down.

POCKET TRUCK SAVES WORK IN HOME AND SHOP

As an aid in moving heavy boxes, barrels and articles of furniture about the home, a small two-wheeled truck that can be easily handled by one person is being manufactured. Weighing only one and a half pounds, the contrivance may be quickly slipped under the edge of the object as it is tilted. Ball-bearing wheels permit the burden to be moved with little effort on the part of the worker. As it eliminates the need of assistance in shifting heavy chairs and similar articles, the housewife can readily perform such tasks, when necessary, in a few moments with the truck. Strongly made, the cart can support loads up to three or four hundred pounds and may be pulled almost any distance without damage to the running gear. Inverted on the corner of a table or bench, the device can act as a roller for sliding trunks or crates onto the higher level. Of advantage to expressmen, storekeepers, offices and in all needs where cumbersome packages are moved around by hand, the little truck effects great saving in time and labor and can be kept in the tool chest.

Small Two-Wheeled Truck and Helpful Service It Renders in Moving Trunks and Crates without Damage to Loads or Floors



Meeting Plane at End of Run, Crew Is Busy as Pilot Steps Out, Unloading Local Mail into Truck for Distribution at Postoffice and Transferring Through Sacks to Another Plane; Inset Shows Pilot Seated in Deep Cockpit, Leather-Lined and Protected by Windshield

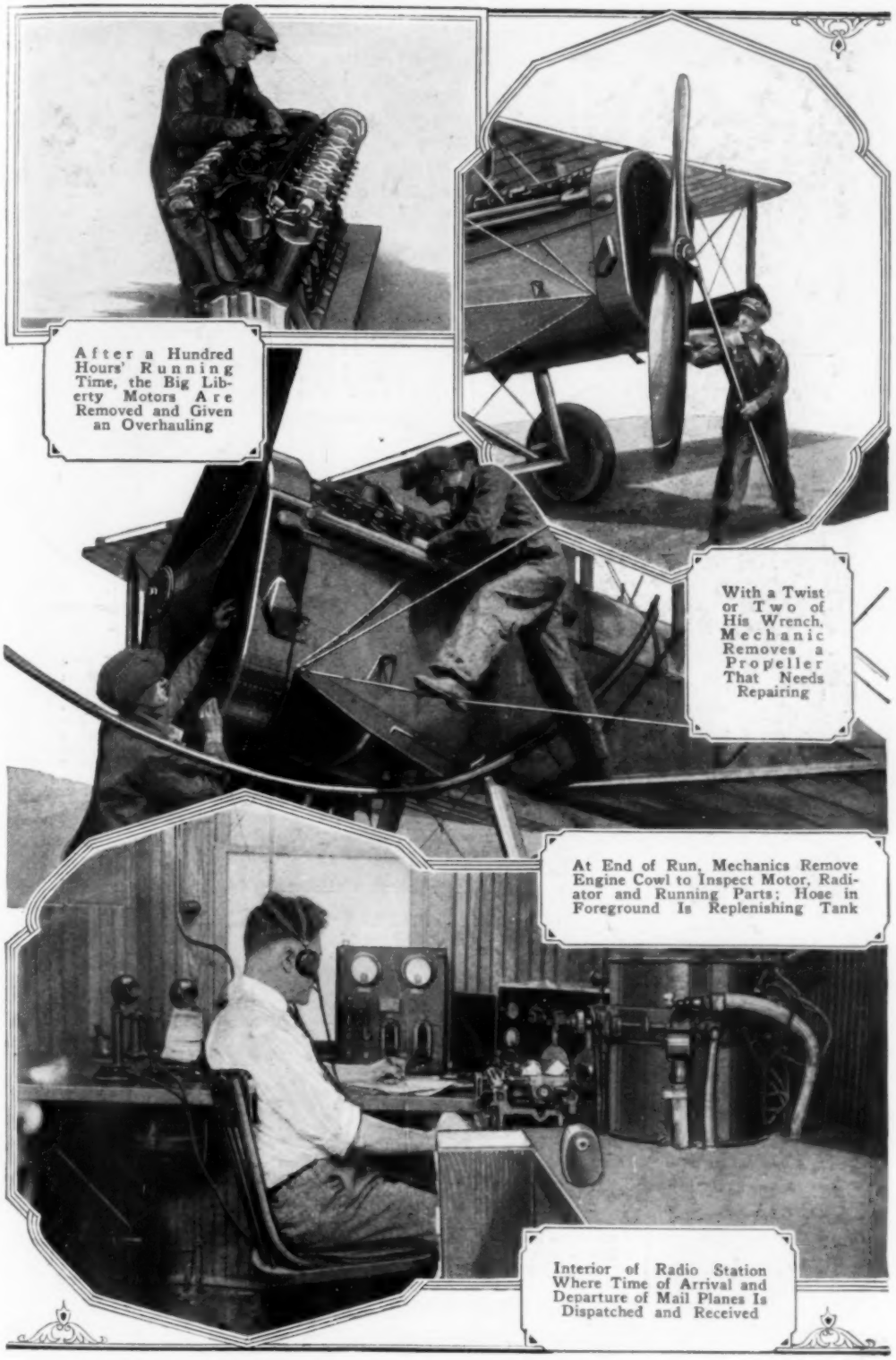
Night Mail Marks New Era in Aviation

Time of Flight from Statue of Liberty to Golden Gate to Be Cut to Twenty-Four Hours

INAUGURATION of daily, regular and permanent air-mail service between the Statue of Liberty and the Golden Gate marks a new era in the history of transportation. Experiments conducted last August when mail planes crossed the continent eight times, flying at night over a lighted pathway a thousand miles long between Chicago and Cheyenne, demonstrated to the postal officials the practicability of the new service. Under the present schedule the east-bound flights from the Pacific to the Atlantic will occupy thirty-two hours while the west-bound fliers will take thirty-four hours and forty-five minutes for the trip. Later it is expected to reduce this time to twenty-four hours. Letters require eighty-seven hours between New York and San Francisco by train. Special air-mail postage has been arranged and stamps in three denominations, eight-cent, sixteen-cent and twenty-four-cent, have been distributed to all the principal cities of the country for use on letters specially designated to go by plane. These stamps will carry letters from any city for transmission to

Successive Light Paths Made by Revolving Roof Beacon That Guides Fliers at Night

Night Mail Plane Preparing to Alight at the End of the Air Trail Where Massive Shafts of Light Guide the Pilot to the Illuminated Landing Ways of the Field

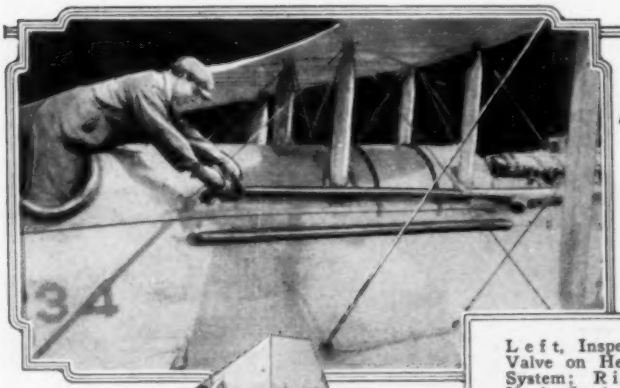


After a Hundred Hours' Running Time, the Big Liberty Motors Are Removed and Given an Overhauling

With a Twist or Two of His Wrench, Mechanic Removes a Propeller That Needs Repairing

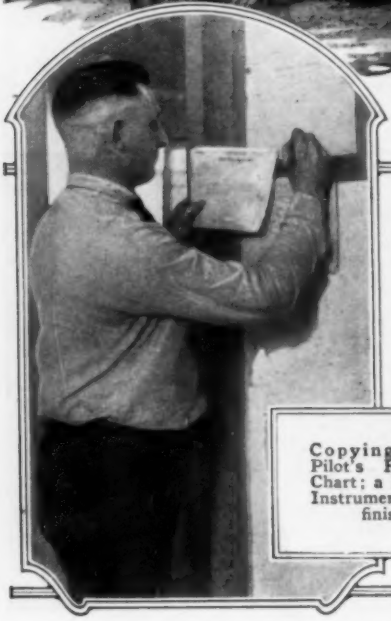
At End of Run, Mechanics Remove Engine Cowl to Inspect Motor, Radiator and Running Parts; Hose in Foreground Is Replenishing Tank

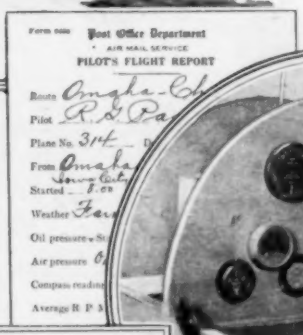
Interior of Radio Station Where Time of Arrival and Departure of Mail Planes Is Dispatched and Received



Left, Inspecting Valve on Heating System; Right, Uncle Sam's Mail Waits While Pilot Kisses Wife

Taking Off Lens That Diffuses Rays of Powerful Portable Searchlight at an Angle of Thirty Degrees to Form a Broad Path of Light into Which Planes May Glide When Arriving on Field at Night

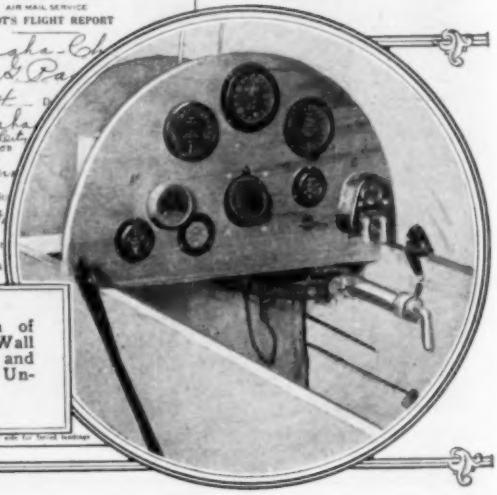




Form 1010 Post Office Department
AIR MAIL SERVICE
PILOT'S FLIGHT REPORT

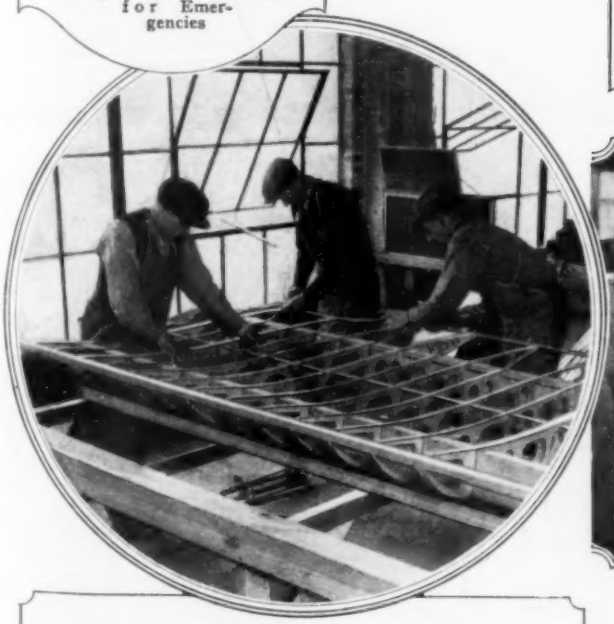
Route Omaha-Ch
Pilot R. L. Pa
Plane No. 314
From Omaha
Started 5.05
Weather Fair
Oil pressure
Air pressure
Compass readings
Average R P M

Copying Radiogram of Pilot's Flight on Wall Chart; a Report Card and Instrument Board of Unfinished Plane



In Case He Must Leap from Plane, Pilot Is Protected by Parachute That Unfolds at Pull of Hook and Opens as He Drops; All Air-Mail Pilots Carry These Parachutes for Emergencies

Pilot Dressed in Flying Suit for Run with Mail; Parachute Is Folded at Hips as Cushion; Releasing Ring Is Seen Just below His Left Elbow



At Work on Wing Frame in Factory, and Rigger Checking Inspection Chart as He Examines Struts

Looking Directly into the "Tunnel" Produced by Rays of 460,000,000-Candlepower Beacon; Below, Adjusting Angle of Portable Light

either coast by air. Parcel-post packages also will be handled.

In their night flights, the pilots are guided by automatic acetylene lights placed every three miles. Every twenty-five miles of the night air lane has an emergency landing field provided with powerful searchlights and at about every 250 miles there is a regular landing field with searchlights visible for from 100 to 150 miles. "Uncle Sam's flying postmen are truly the pioneers of a new era in transportation," Col. Paul Henderson, second assistant postmaster-general, declared in speaking of the new service. "I have great faith in the ability of mankind to so perfect aircraft as to make it an essential part of our general transportation schemes of the future. The courageous pioneering work being done by the pilots of the air-mail service is each day contributing its share toward that Utopia. They are entitled to the respect and admiration of the nation."

Gold Fields Are Tapped by Planes Run by Canadian Railroad

Airplane service, operating on regular schedule into a territory heretofore untouched by steam or electric transportation, has been instituted in the gold-field district of the province of Quebec in Canada. With a capacity of five passengers and a limited amount of supplies, the planes meet all trains at a town at present the farthest point north in the district tapped by a railroad. The service is said to have opened up virgin timber, hunting and mining districts and has reduced the trip from the railroad into the gold fields from two days to about fifty minutes. The rush of prospectors into the fields is said to have prompted the railroad company to provide the added transportation.

Hard Coal Is Substitute for Jet in the Making of Jewelry

Polished hard coal as a substitute for jet in the production of rings, necklaces, watch fobs, ornamental hat trimmings and similar articles, is being experimented with by a German inventor. Selected hard coal is used and after the substance is cut as near to the required dimensions as possible, it is finished off with fine files and then polished. Monogram rings inscribed with initials inlaid in white enamel present a smart appearance, and few are said to be able to guess the nature of the substitute.

New Capitol Built over Old Saves Rent for State Offices

Replacing the old Nebraska state capitol with a $5,000,000 structure on the same site, while government work goes on unhampered in the present one, is a feat being accomplished at Lincoln. When the new building is near completion, the old one inside will be torn down. The wrecking promises to be an interesting engineering operation, as the present capitol is built entirely of stone and has a dome that rises 300 feet from the ground. Just enough room is being left between the new walls and the old building for a railroad track to carry away the debris. While six or seven years will be required to complete the project by this method, the contractor expects to save the state two or three years' rent on offices.

Photo-Diagram Showing How the New Nebraska State Capitol Is Being Constructed over and around the Present Building, Which Will Be Wrecked When the Other Is Near Completion

Fads and Fancies of Beauty from Capitals

Belle of Samoa Dressed for a Dance

Young Papuan Widow Decked in Mourning "Robes"

Egyptian Daughter of the Nile in Cairo

Hindu Princess in Her Wedding Dress

First Lady of African Tribe in Holiday Attire

One of China's Fairest Members of Cultured Class

Dancing Lady of Tahiti in South Sea Festive Gown

of the World to Outposts of Civilization

Austrian Maiden of the Tyrol Region

American Girl Athletes Set for Running Contest

Mexican Senorita as Queen of a Festival

English Beauty, Winner in a Competition

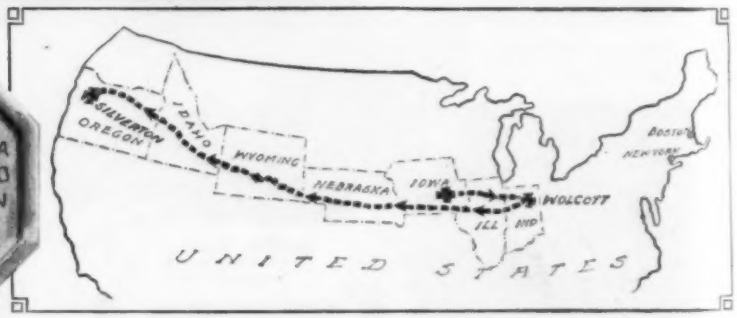
Jewelry-Clad Girl of Nepal Dressed for a Feast

One of France's Renowned Screen Stars

Fashionable Lady of East Africa with Tattooed Face

Dog Travels Three Thousand Miles to Home and Gets Medal

Bob, a Scotch collie, recently traveled approximately 3,000 miles to return to his home in Oregon after having been lost in the middle west. Its owners had taken it with them on an automobile trip, and while they were crossing Iowa, Bob strayed away. After an unsuccessful search, they went on to Indiana and then drove back to the Pacific coast, never expecting to see their pet again. Six months after their return, Bob came trotting home, weak from fatigue, footsore and with claws worn short. It developed that the animal had trailed the automobile from Iowa to Indiana and then had started back on the long trip to Oregon. The state humane society, after investigation, presented the dog with a medal and school children petitioned the village council to give it the freedom of the streets for the rest of its life.



Map Showing Three-Thousand-Mile Route Traversed by Collie in Finding Its Way Half across Continent to Reach Home; Photographs of Dog and Medal It Received

Rubber Lighter than Cork Rivals Air in Expansion after Squeeze

More buoyant than cork, a rubber product being manufactured in England is said to have a resiliency almost equal to that of air. After long compression under a load of about seven tons a piece of the material regained its shape within a few seconds. The substance floats, and a small sheet of it an inch thick can easily support a heavy man on the water. Owing to its non-absorbent qualities, it is believed it may be used for mattresses and chair cushions aboard ships, thus insuring greater life-saving facilities in case of wrecks. The material consists of rubber expanded by gas, but can be compressed to the hardness of wood, with equal strength and lighter weight. It is also claimed that it can be used to add strength to metal tubing by employing it as a closely packed filler inside the hollow cylinders. As the material can be made in several degrees of hardness it is expected that interiors for dwellings can be made from it.

Ostrich Legend Is Called Untrue

Despite the popular belief, ostriches do not hide their heads in the sand when fear afflicts them, according to Vilhjalmur Stefansson, the arctic explorer. The legend has persisted for nearly 2,000 years, but naturalists agree that it has doubtless resulted from the actions of the big birds when they are pursued. Even in storms, scientists say, they stick their heads under their wings until the blast is over.

Freak Shadows Stay in Oil Pools After Object Has Moved

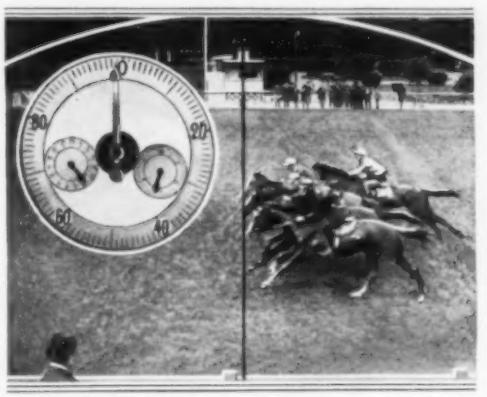
Curious shadows that remain after the object has been removed, are produced on the surface of pools of crude petroleum in the great oil fields of California, according to residents of the regions. If, when the sun is shining, a person stands so that his shadow falls across the surface of the oil and then moves, the first reflected image remains on the pool, while a second is cast from the new position. The longer the individual has been standing by the pond, the longer will the original shadow remain. The hot rays of the sun produce gas in the oil which rises to the surface in the form of millions of bubbles, far too minute to be seen by the human eye. When a shadow is cast over the surface, the temperature is reduced, and this has the effect of checking the production of bubbles. The result is that the shaded area looks different from the part that is exposed to the sun. When the person moves, the temperature of the oil which has been shielded, does not at once go back to its former warmth. It takes a little time to heat, and until this has actually happened, the curious effect remains.

Gun with Three-Hundred-Ton Barrel to Defend Harbor

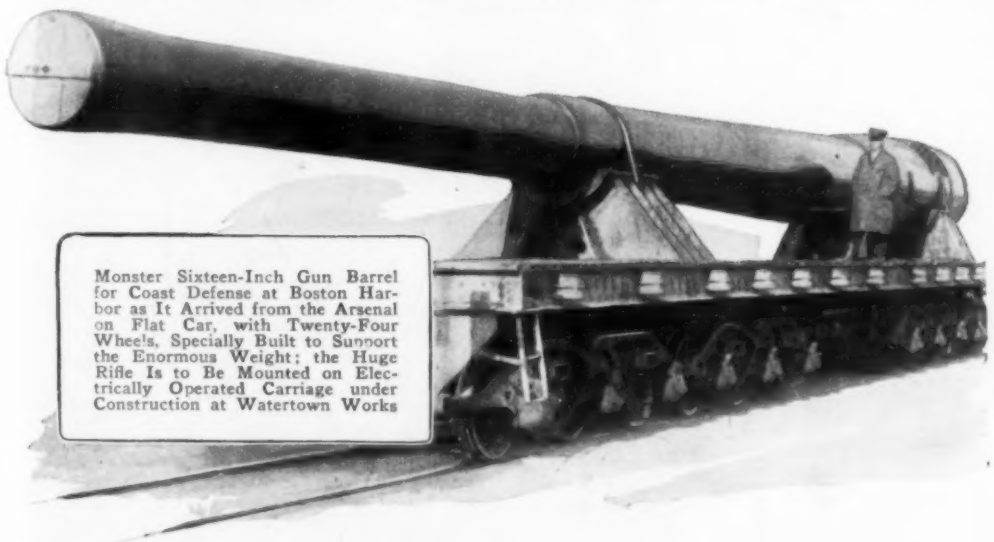
Weighing 320 tons without its carriage, a sixteen-inch coast-defense gun was completed at the Watervliet arsenal not long ago and shipped to Boston, where it is to be mounted to help defend the approaches to the harbor. A flat car with twenty-four wheels was provided for transporting the monster gun, which was supported and bound to the car with specially designed anchors and straps of steel.

Camera Clock Records Race Victor as Finish Line Is Crossed

Capable of registering to the one-hundredth part of a second, a combination clock and camera has been invented to avoid mistakes in timing races. As the winner crosses the line, he breaks a thin string connected with the camera. This releases the shutter and, as the lens is pointed directly on the finish, the exact position of the runners is obtained. At the same instant, the clock mechanism is stopped and the exact time registered.



Big Dials of Speed Clock and a Close Race Finish Caught by Camera



Monster Sixteen-Inch Gun Barrel for Coast Defense at Boston Harbor as It Arrived from the Arsenal on Flat Car, with Twenty-Four Wheels, Specially Built to Support the Enormous Weight; the Huge Rifle Is to Be Mounted on Electrically Operated Carriage under Construction at Watertown Works

Washing and "Racking" Baking Pans, after Which They Go to Drying Cells; Right, Automatic Peeler at Work Paring Apples; the Fruit Drops onto a Traveling Belt and Is Carried to Cookers

Pastry-Molding Machine That Makes "Open" Pies and Crusts for the Custard Varieties

Courtesy Case & Martin

Baking the Nation's Millions of Pies

Large Factories, Where Machines Perform All Work Free from Human Hands, Turn Out Pastry "Like Mother Makes"

ONLY a little while ago, Saturday morning generally found mother in the kitchen busy with the weekly pie baking for a hungry household. But the picture is changed today. Now electrically driven machinery does the work in large, clean plants, turning out pies by the tens of thousands every day. And they are palatable and pure pies, made from just the same materials that mother used.

One of the principal machines employed in the manufacture of pies in the present-day baking factory is a device into the hopper of which many barrels of fresh apples are emptied. From this magazine they are fed onto a series of revolving spindles where keen knives pare and core them before they drop on a traveling belt. Passing in front of a line of women operators who inspect the fruit, any specks or imperfections in the apples are cut out as they move along on their way to the tubs in which they are packed for the cooking caldrons.

Bananas are treated in a similar manner, being prepared by a machine that slices them in lots of a dozen at a time. Each individual piece of this fruit must also pass a rigid inspection before it is permitted to go into the slicers. All fruits for pie fillings are made ready and cooked during the daytime, and are set aside in huge vats to cool in time for use in the evening, for most pie factories do their baking at night to insure an absolutely fresh product to the consumer for the following morning.

Extracting Finished Pies from Huge Factory Oven, Four at a Time, and Replacing Them with Unbaked Material, a Process a Thousand Times Faster than That of the Kitchen Method

Fresh fruits are used the year around in many of these baking plants. Bought in season direct from orchards and vineyards, they are stored in immense refrigerating rooms for future needs. Only the choicest grades are selected and these must be taken to the cold chambers as soon as possible after being gathered. Here they are stacked in their original containers, and are not allowed to thaw after they are once frozen, until made ready for the cooking vessels. A single large factory handles more than 60,000 cases of blackberries, blueberries, cherries, pineapples,

strawberries and raspberries in this way every year without impairing the flavor of the fruits. In sifting the flour and kneading the dough for the crusts, large flour sieves and dough mixers do the work of many hands. A crust machine receives the supply of dough, cuts it into definite circular portions and delivers it on a belt traveling to a set of rollers where one piece is dropped into a waiting pan to form the lower crust. The other part is rolled, dropped on a flat surface where it is stamped with the indicating mark of the pie, and as the pan with the bottom half into which filler has been poured, passes that point, the cover crust is placed in position on the top. It is then carried to the knives which trim the surplus dough from the edges and on the same conveyor is sent to the ovens. These huge, heated vaults contain moving trays, holding about 560 pies. Twenty minutes are required for a pie to complete its baking cycle, being kept constantly in motion during that period. When properly baked, the pastry is removed to big racks and from these loaded onto delivery trucks. Large fleets of "pie wagons," now mostly motor vehicles, with their contents neatly housed and protected from dust and dirt of the streets, deliver the night's baking to customers.

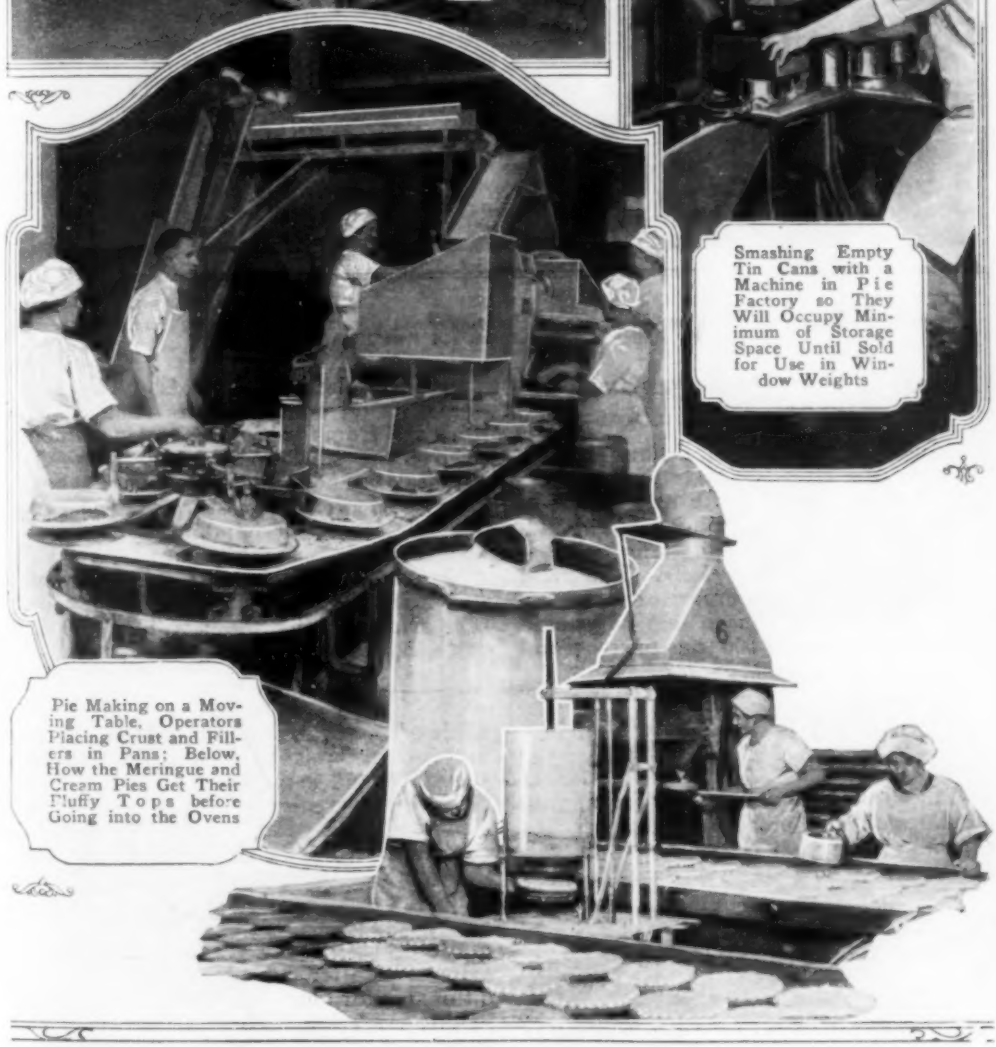
Where canned fruits are used, the empty cans are smashed by a special machine into solid round lumps of metal and are sold to be manufactured into window weights. Empty flour sacks are cleaned by compressed air and returned to the mill. Used baking pans are placed in large closed tanks where clear hot water is poured on them to soften any particles of the crust adhering to the surfaces. After scrubbing with soapy water, they are rinsed in hot water and put in a steam room to dry. Following each day's operation in the bakery the entire equipment is given a thorough cleansing to comply with the sanitary rules of the food industry.

In addition to paring and slicing machines, most factories have apparatus to beat eggs and mix cream fillings, and others to stem and seed cherries, while devices are to be seen filling the crusts of pies of the custard type and pouring on the meringue top in artistic designs. In a mid-west pie-baking plant, a year's supply of ingredients is represented by 10,000 barrels of flour, 2,000,000 pounds of sugar, 1,000,000 pounds of shortening and 3,000,000 fresh eggs. It also consumes 65,000 gallons of milk, 50,000 bushels of apples and almost as many peaches, lemons, raisins and other popular fruits.

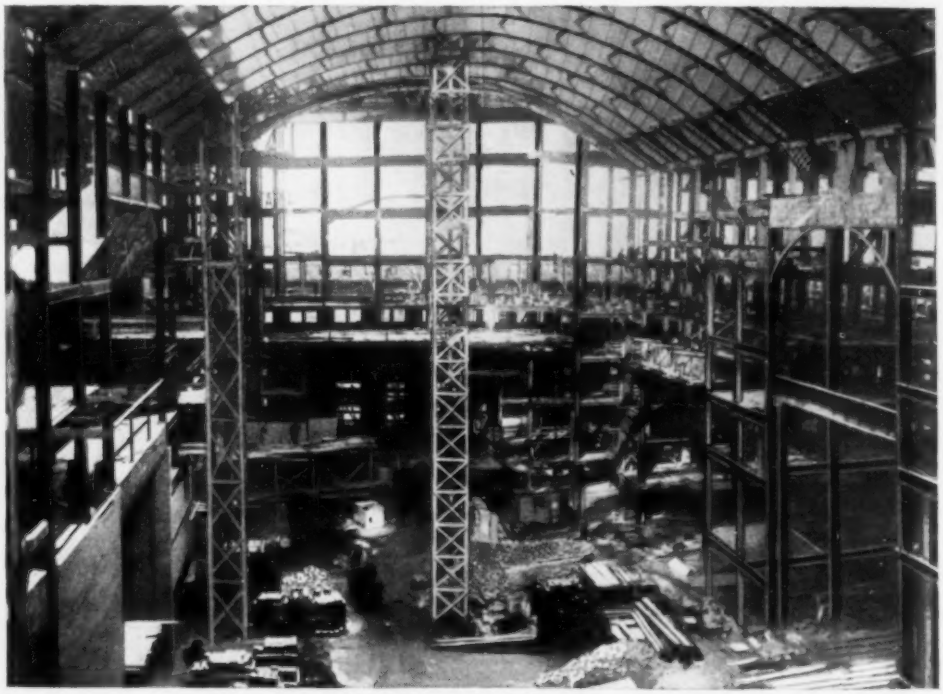
In the Olden Days Every Member of the Household Assisted in the Annual Task of Peeling, Slicing and Stringing Fruits to Be Dried for Future Pie Making

Large Traveling Oven of Modern Bakery Where 560 Pies at One Time Are Kept Constantly Moving as They Bake

Smashing Empty Tin Cans with a Machine in Pie Factory so They Will Occupy Minimum of Storage Space Until Sold for Use in Window Weights



Pie Making on a Moving Table, Operators Placing Crust and Fillers in Pans; Below, How the Meringue and Cream Pies Get Their Fluffy Tops before Going into the Ovens



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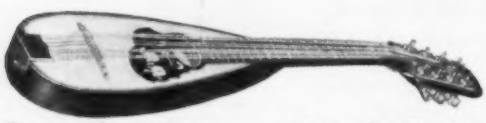
Where Busy Hammers Prepare for Thousands of Hurrying Feet; Constructing Chicago's Union Passenger Station Waiting Room, 114 Feet High

Great Chicago Passenger Station Is Nearing Completion

Chicago's $75,000,000 Union station, work on which was started in 1914, is expected to be ready for use by the first of next year. When completed, the building will provide accommodations for more than 100,000 passengers daily. The great concourse and the main part of the structure cover 180,000 square feet of ground space. More than 17,000 tons of structural steel have already been used. The building rests on concrete piers sunk to bedrock and from four to nine feet in diameter. Above the station, an eight-story office building has been erected. This will be increased to twenty-two stories later. Separate platforms for handling baggage and passengers, stands with space for 120 cabs at one time, stores, lunch and dining rooms, and a large cafeteria are to be installed. The main waiting room will be 100 feet wide, 217 feet long and 114 feet high.

Violin, Ukulele and Mandolin in One Plays as Any of Three

With the tonal qualities of a mandolin, a small, compact musical instrument has been imported from Germany, which can also be played as a violin or ukulele. It is made of mahogany and Pernambuco wood, and is finely finished. The bulky bowl of the violin and mandolin is eliminated, the thickness through the center being barely two inches. A patent tuning device keeps the eight strings in perfect line, and aids the tone and pitch.



Compact Musical Instrument which Can Be Played as a Mandoiin, Violin or Ukulele

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¶We want all our readers to write us freely and often whenever they wish additional information on articles published in this magazine. Address Bureau of Information, Popular Mechanics, Chicago.

Mother-of-Pearl Tile Adds Beauty and Novelty to Design

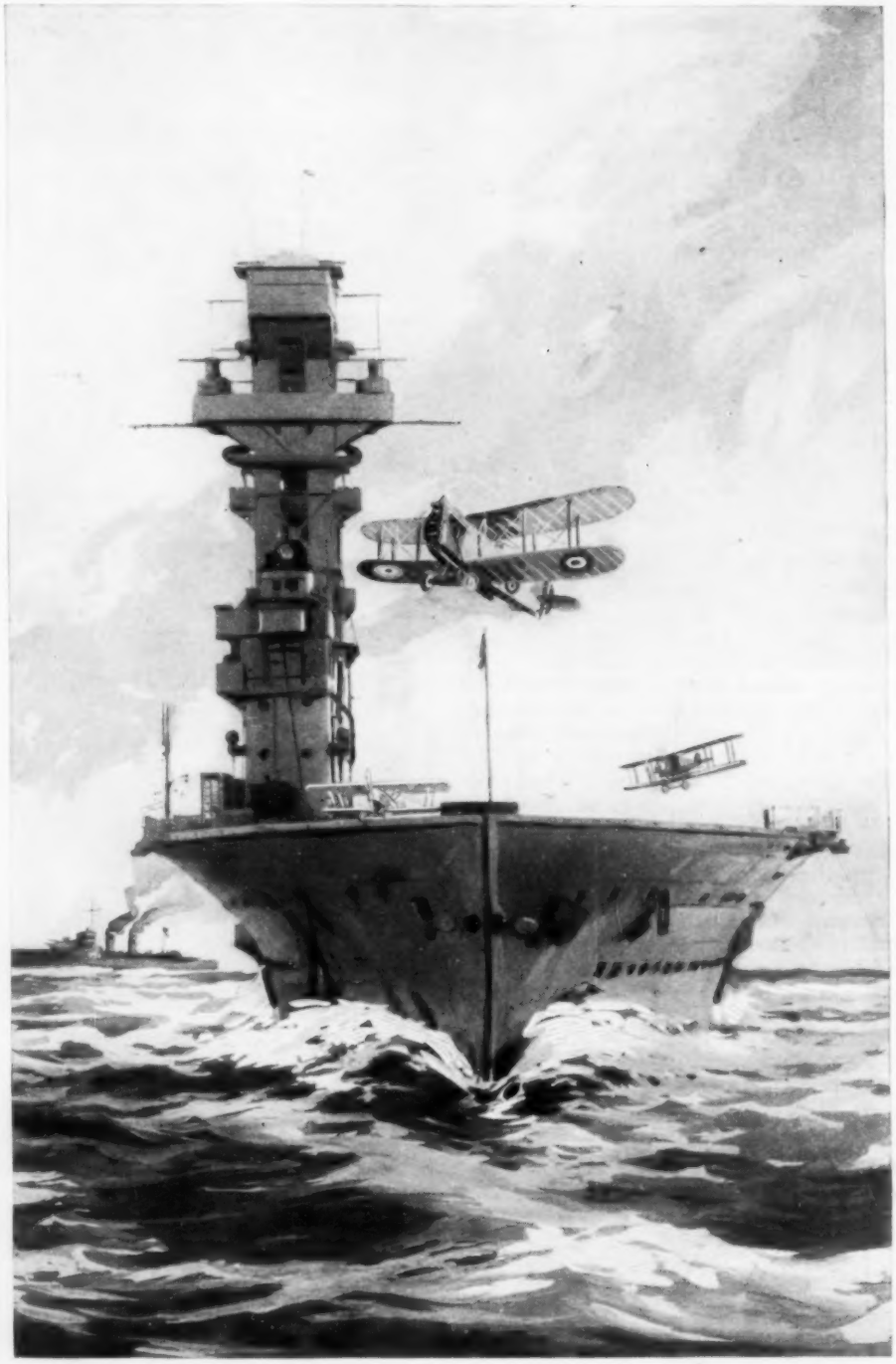
Adapted to all forms of architecture and design, a method of forming tile or slab of mother-of-pearl has been patented. Crushed shell mixed with cement is formed into blocks, the surfaces of which are then smoothed and polished. If desired, the pieces may be arranged in the molds in fanciful shapes and figures, such as star designs, and a cement mixed with color used so that the finished surface will present an artistic finish resembling a mosaic. Formed in this manner, the tile may be used for various purposes, such as furniture tops, baseboards and border work. If desired, the mother-of-pearl may be confined merely to the surface layer of the tile or brick.

Serve-Self Store on Wheels Saves Time for Housewives

Taking the grocery store to its customers is the service rendered by an automobile truck that carries a full stock of food products, meats and vegetables and is capable of making 400 calls a day on purchasers of its wares. Operated by a driver who is also the clerk, the motorized "food shop" has shelves and bins of goods placed within easy reach of the buyers, who gather their supplies in "trolley" baskets suspended from an overhead track. As the patrons leave the store on wheels, bills are paid and packages unloaded from the container, leaving it ready for the next purchaser at the entrance of the truck. So convenient is the arrangement that it is said to occupy only a small fraction of the time generally necessary for a housekeeper to buy the day's food needs at ordinary stores, besides doing away with the necessity of traveling any distance to attend the task. The interior of the affair is well lighted and heated, and affords sufficient room for several persons to move around. A refrigerator is carried, neatly built into a compartment, for the accommodation of fresh meats and perishable products during hot weather. A show window at the rear of the car displays green groceries and fruits, while ventilators in the roof insure good air circulation. On the ceiling is a large panel containing the list of materials carried, and each rack has a large tag showing the price of the article it contains. The machine covers an average of forty blocks in a day's travel, and because it cannot be affected by severe weather, insures its customers of well-filled larders if they do not care to go out.

Patrons at Door of Store on Wheels Which Saves Time for Busy Buyers

Rear of Motorized Grocery Shop and Purchasers Selecting Needs from Handy Shelves



Aircraft Mother Ship "Hermes," of the British Navy, Built to Carry Twenty Planes Which Are Lifted Aboard by Electric Cranes and Launched from the Deck Landing Field

Orchid Growth Hastened Two Years by Feeding Salts and Sugars

Orchids that are maturing two years sooner than under natural conditions and treated bacteriologically so as to obtain practically 100-per-cent germination, are being grown by a botanist in an eastern university. The flowers were planted in sterilized tubes five years ago. By feeding them essential salts and sugars and eliminating the bacteria which ordinarily would prove destructive, the botanist is hopeful of almost perfect germination. After a few months' growth in these tubes, the seedlings are transferred to large flasks containing the same culture medium. Under such favorable conditions, the plants grow rapidly and when they have five or six leaves and roots an inch or two in length, they are transplanted to open pots. In addition to the rapid growth, it is pointed out that there is no danger from insects or parasite fungi during the early life of these "bottle-fed" flowers.

Steering Gear for Camel Is Rope Through Nose of Animal

Desert travelers who ride to their destinations on camels, guide their animal by a rope pulled through its nose. One end of the rein is tied around the animal's neck and the other run up behind one of the ears and down the face into a hole pierced in the upper part of the nose. A

Camel with Rope and Nose Rein by Which the Rider Guides Animal over Desert Wastes

heavier rope is looped around the long face of the camel. With this arrangement, the rider becomes master of his conveyance and can make it go wherever he pleases.

Mission on Motor Truck Has Radio and Phonograph as Gospel Aids

Equipped with a radio outfit and a talking machine, a mission on a motor truck is used by an eastern evangelist on tours

Evangelist Fred L. Strickland and His Traveling Mission Showing Radio and Music Box

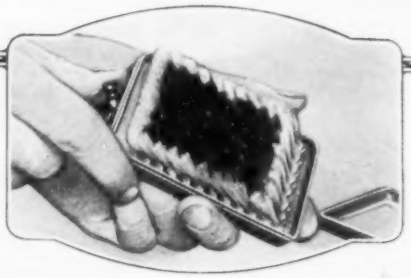
about the country. The pulpit is placed on the endgate, which serves as a platform for the preacher, and adjustable shelves at the sides hold the radio loud speaker and the music box. They have been found useful in leading the hymns and in drawing crowds. The truck interior is furnished as an apartment in which the minister lives while traveling.

Boiler Scale Is Prevented by Use of Electric Current

Scale formation on the walls and tubes of boilers is prevented by the use of electricity. The negative pole of the source of current is connected to the wall of the boiler while the positive is connected, through an insulated part of the shell, to a piece of iron hanging in the water. The action between the two poles deposits hydrogen on the sides of the boiler that are under water and the hydrogen decomposes the calcium sulphate of which the scale is mainly formed. There remains only a muddy and loose substance that does not influence the transmission of heat and which may be easily flushed out. If the feed water contains acid that may corrode the walls, the dissolved metal is redeposited at the sides so that the influence of the acid is neutralized. The current must be small in order not to decompose more water than is necessary to prevent the formation of scale.

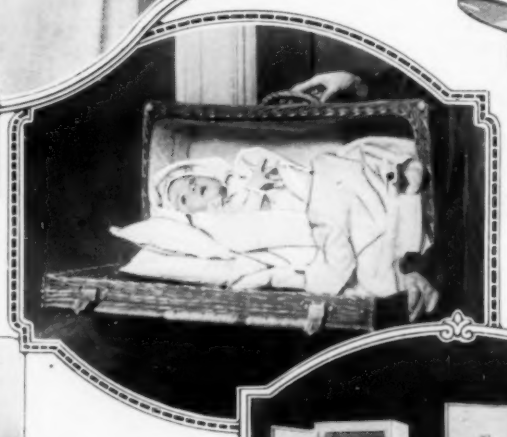
Time and Money-Saving Tools

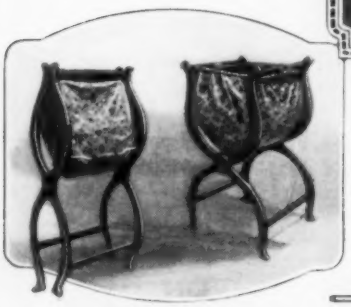
Wire Spring Clips on Dress Hangers Keep Garments Neatly Stretched and Prevent Their Falling Off



For Traveling, a Clothes Brush with Bristles That Fold Down Flat in Pocket Holder Is Found Convenient

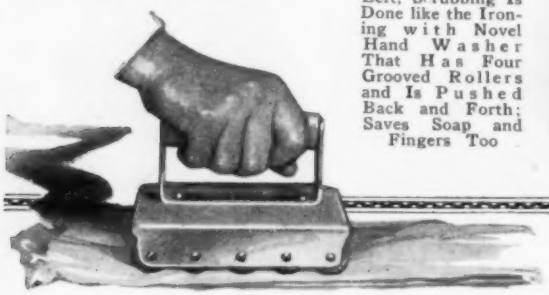
Soaked in Kerosene in Handy Jug, a Fire-Clay Ball Will Sometimes Start Obstinate Coal Fires Blazing



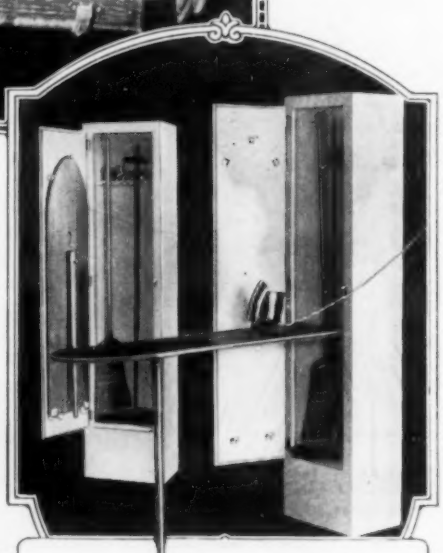


Baby May Travel in Comfort in Well Ventilated Wicker Cradle Handled like Suitcase

Folding Sewing-Basket Stand Saves Space and Is Decorative



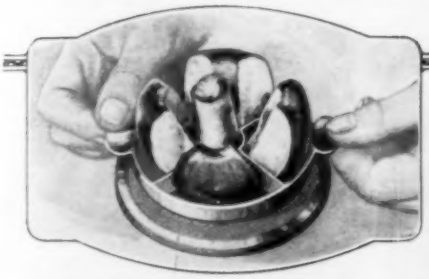
Left, Scrubbing Is Done like the Ironing with Novel Hand Washer That Has Four Grooved Rollers and Is Pushed Back and Forth; Saves Soap and Fingers Too



When Space Is Limited, Combination Ironing Board and Broom Closet Solves Household Problem

Anyone wishing further information on devices described in the editorial pages can

for Woman's Workshop in Home

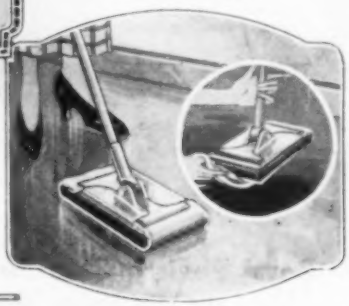


One Stroke of Novel Cutter Quarters an Apple and Removes Core; Knife Edges Are Protected by Wooden Platter That Holds Fruit

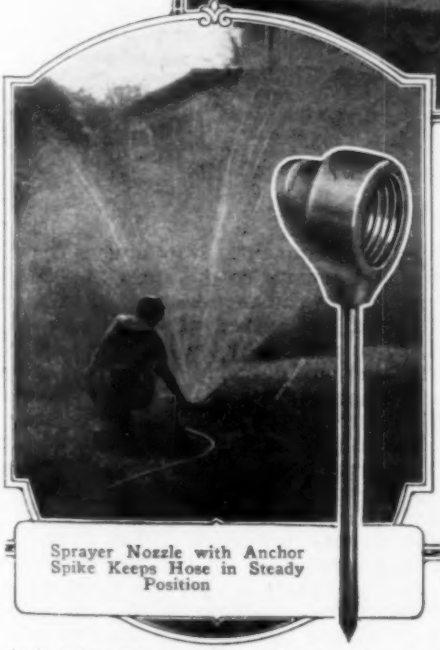
Strainer Holder Helps in Making "Jell"

Modish Belt and Purse Combined Add Attractive and Useful Touch to Street Costume

Rubber Nursing Bottle Can't Break and May Be Turned Inside Out for Easy Sterilizing

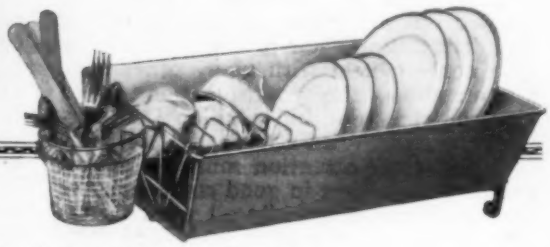


Right, Floor Waxer and Polisher Run like Carpet Sweeper



Sprayer Nozzle with Anchor Spike Keeps Hose in Steady Position

Below, Draining and Drying Dishes Are Quickly Done in Oblong Rack with Wire Basket for Silver Attached; Specially Suited for Small Kitchens



obtain it by addressing Bureau of Information, Popular Mechanics Magazine, Chicago

Working Group Drawing Chicken Feed from Farm Warehouse
Supervisor Candling Eggs Before They Are Sent to Buyers
Boy Workers Delivering Eggs to Central Storeroom for Inspection and Packing
EARLY RISER POULTRY CLUB
DURHAM, CONN.
Seal of Club That Appears on Boxes; Right, Feeding Time

Boys' Poultry Club Serves Egg Market from Farm They Run

Composed of a group of boys interested in the collective production and marketing of chickens and eggs, the Early Riser poultry club of Durham, Conn., has worked out a modern system for selling and distributing their products. In a recent contest, held with many other such organizations, the youthful poultrymen won the championship position for judging chickens. With a flock of 1,000 hens, to which close attention must be paid if they are to be kept in good condition, the club performs practically all work necessary to provide the farm with feed mixtures and equipment. New houses for the fowls and repairs to old ones are all attended to by the members. Grain feeds are sorted and mixed at a central point and, when needed by the various sections of the club, are parceled out and recorded to show actual costs at the end of the season. In selling the eggs, almost the entire twelve months' supply is marketed directly to homes. All product is graded by candling and the highest prices are received. In some cases eggs are sold in wholesale lots to dealers, and at times the boy salesmen carry on selling campaigns in order to create outlets for their wares throughout neighboring cities. All boxes and crates are labeled with the club seal.

Fortune Spent in Cleaning Liner for Paint and Polish

Every time a liner arrives at its home port, a small fortune is spent in cleaning the ship. All the linen is bundled ashore to be washed in the company's own laundry. In one such plant, close to 6,500,000 pieces are handled in a year. Carpets are taken up, floors scrubbed and mattresses either aired or sterilized. For washing and scrubbing a steamer such as the "Olympic," it is said that in the course of a year nearly 20,000 gallons of liquid soap, 70,000 pounds of soft soap, 22,000 pounds of soap powder and 15,000 pounds of soda are used. All the paint work is gone over and the brass polished. For this latter work, more than 5,000 pounds of paste are needed each twelve months. Once a year the ship is laid up for painting.

Trackless Sidewalk Auto Seats Thirty Persons

Carrying thirty passengers, an automobile has been made to run on sidewalks as an aid in solving city traffic problems. An open and a closed compartment provide easy means of entrance or exit. The car is only twenty-three feet long and a little more than six feet wide and weighs about two and one-half tons. It is propelled by an engine mounted in the rear of the driving axle. Cushion tires, double in the rear, and special springs assure comfortable riding. It is especially designed for parks and waterfronts and other places where there is a long stretch of walk.

Sidewalk Motor Car with Open and Closed Compartments, Offered as Aid to Traffic Problems

So fast does a machine that cuts up wood into matches operate, that in a single minute it will turn out 40,000 splints.

Thrills Added to Swimmers' Sport by Flying Rings over Pool

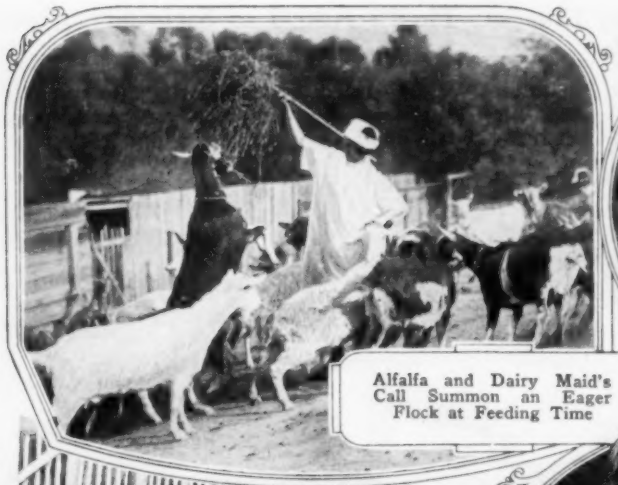
Suspended from a long pole over one of the pools at Sulphur Springs, Fla., is a pair of flying rings and a chain on which swimmers perform various stunts before dropping into the water. Variations of fancy diving are attempted, and the exercise is found to be invigorating after a long swim. The pool is continually welling up with sulphur water from a "bottomless" spring at the rate of nearly 60,000 gallons a minute. Because of the great depth, only expert swimmers are allowed in it.

Copyright, Underwood & Underwood

Performing Aerial Stunts with Welling Waters of "Bottomless" Spring as Life Net

Golf Balls Marked to Aid Players

Players often confuse their balls when using the same kind, and to remedy this, manufacturers are marking the balls with numerals or with colored dots. Those identified by figures are numbered from one to four, so that each member of a foursome readily can claim his own. Similarly, red, blue, orange and black dots are imprinted on the surface of the balls to provide distinguishing marks.

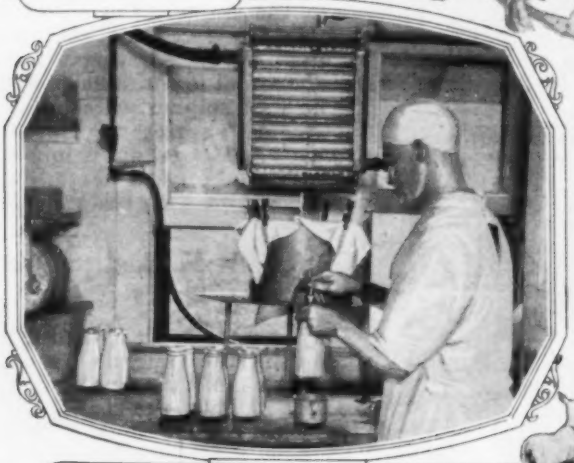


Alfalfa and Dairy Maid's Call Summon an Eager Flock at Feeding Time

Loading "Goat-'airy" Motor Truck for a Morning's Delivery to City Customers

"Good for All Kids," Is Verdict of Food Experts on Goat's Milk

Released from Barn after Milking, Goat Herd Scampers Out to Pasture



Inside Milk Cooling and Bottling Room Where Pints and Quarts Are Filled for Delivery

Straining Milk into Supply Tank Connected to Cooler on Floor Below

Goat Dairy Run by Woman Pioneer Supplies City with Milk

Goats, long cultivated in Europe, are gaining in popularity in the United States because of the excellence of their milk. Near Los Angeles, a woman pioneer in the business manages a goat dairy. The animals are given a thorough washing every day. They are milked in the morning and afternoon and the product is strained, sterilized and bottled in modern dairy apparatus and delivered by motor truck. The milk is in special demand for infants and invalids, and makes good cheese and butter. The cost of keeping the animals is said to be moderate. They are fed on alfalfa and grain. In many parts of Europe, goats are driven through the streets and milked at the door of the customer.

Play Horseshoe "Pitch" with Cards

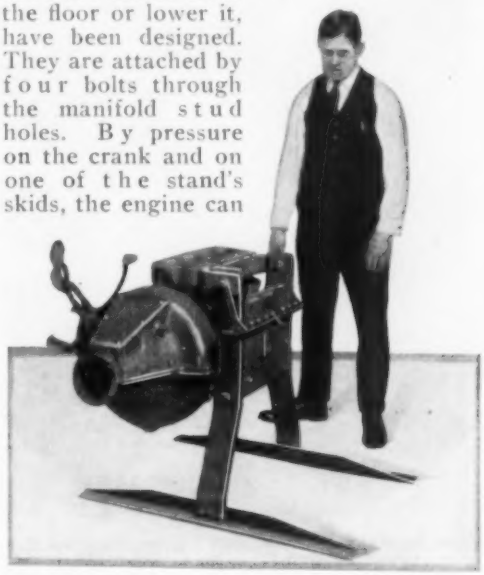
To afford indoor amusement for horseshoe pitchers and others interested in that pastime, a deck of cards containing the various points of the game has been devised. Each pasteboard square bears an illustration of a peg and shoes in position to represent an actual play that commonly occurs in outdoor competitions. A set of rules governs the scoring.

"Jazz" Effects Are Easily Produced with Steel Hand Instrument

Adapting the principle of the "musical saw," a steel hand instrument has been made to produce unique "jazz" effects. It consists of a steel band fitted to a frame holder and struck by two hammers. Various notes of flutelike quality and tremolos, loud or soft, may be produced by flexing the band with the thumb. The instrument is said to be adapted equally to solos or accompaniments and anyone can learn to play it with little practice.

One-Man Engine Stands for Autos Save Time and Repair Costs

To save time and reduce the cost of making automobile repairs, stout steel stands with which one man easily can raise the motor from the floor or lower it, have been designed. They are attached by four bolts through the manifold stud holes. By pressure on the crank and on one of the stand's skids, the engine can be "walked" to an upright position with little trouble. A patented retaining rack is provided, which has spring plungers fitting over the valves to press them against the push rods and keep them from falling out or from buckling or bending. The stand allows the mechanic to get close to his work at a convenient height, weighs only 89 pounds, will not tip over, it is claimed, and has a removable tool tray within easy reach. A similar stand is designed for work on the axle assembly.



Engine Bolted to Stand and Raised from Floor by One Man; Note Broad Supports

"Song of Stars" Is Heard as Light Is Changed into Sound

Light rays from Capella, a star many millions of miles from the earth, are reported to have been turned into audible sounds by means of apparatus invented in France. The experimenters started with the known fact that, under the action of light, cells of selenium give off a feeble electric current. Instruments were therefore devised for amplifying the current produced by light from the star to such an extent that it could be heard by listening in with head phones.

Legless, One-Armed Man Conquers Obstacles in Driving Automobile

What may be accomplished in overcoming physical obstacles is shown by the feat

How Ingenuity of One-Armed, Legless Man Has Conquered Physical Obstacles in Driving Car

of Andrew W. Cromshaw, of Alliance, Ohio, who has become a skilled automobile driver despite the fact that he has lost both legs and one arm. Specially devised attachments to the brake, clutch, gear shift and steering wheel enable him to manage his car with almost as much ease as the ordinary driver. So adept has he become, despite his handicap, that he has won the reputation of being one of the most skilled drivers in the city.

Quality of Panama Hats Revealed by the Rings in Crown

Counting the number of rings of strands in the crown reveals the quality of Panama hats, according to dealers. The more of these there are, the better the grade. Color, texture and shape are important factors, too, they say, and if any broken straws are revealed, the value is decreased. Furthermore, a good Panama hat is never bleached after being woven. Those of superior grade are the original color of the little strips of leaves from a dwarf palm-tree plant that grows in Ecuador and other South and Central American countries, where natives weave the best hats. It takes three months or more to finish those of the highest quality. All the work is done by hand and only the best and longest fiber is used. Reports that the most expensive hats are woven only by candlelight or under water are said to be erroneous. However, the straw is kept damp and at night the unfinished hats are hung where they will be exposed to the dew, so they can be worked on without danger of breaking the strands the following day.

Putting Out a Cheaper Grade of Panama Hats to Dry on Pegs in the Sun after the Bleaching Process, a Step Unnccessary in Manufacturing Better Qualities

Airplane View of Muscle Shoals in Northern Alabama Where Wilson Dam Extends for a Mile across the Shallow, Broken Bed of the Tennessee River

What Muscle Shoals Means

World's Greatest Hydraulic Undertaking Started in War Days to Become Immense Factor in Aid of Farms and Industries

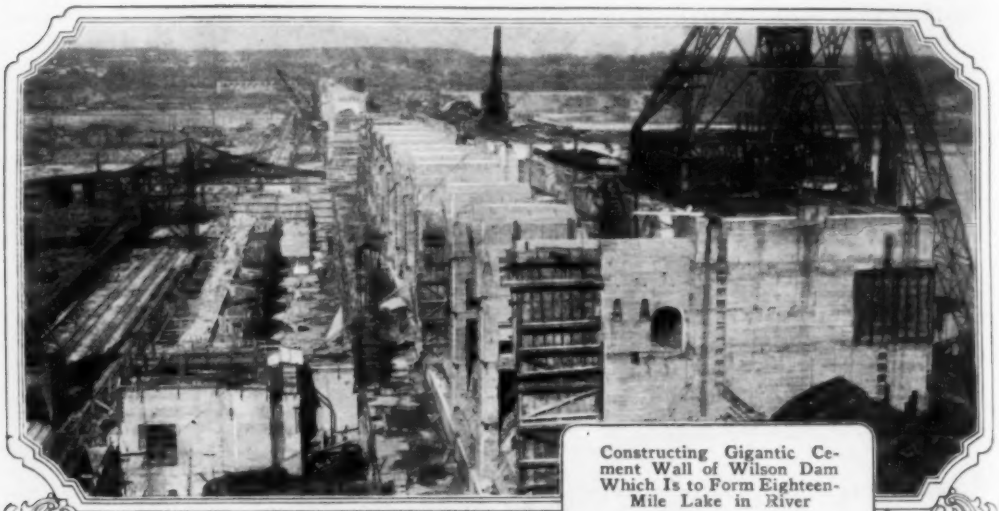
WHILE almost everyone has become more or less familiar with the name Muscle Shoals, but few people seem to have a clear understanding as to the location, size and purposes of the project which the name has come to designate.

At present the greatest hydraulic development in the world, and a task of engineering second only to the Panama canal, the undertaking, started in the summer of 1918, was planned to be the source of supply for the large amount of nitrates demanded in the manufacture of high explosives for the American armies in the great war. The site of the immense plants is on the Tennessee river in northern Alabama, and the erection of the entire structures of the operation is in the hands of engineers employed by the government under whose supervision the project is being carried on.

Since the need of nitrogen compounds for war material is no longer a pressing one, the plants erected for that purpose are to be devoted to the manufacture of nitrates required in the composition of fertilizers. The first one of these completed, nitrate plant number 2, has a capacity of 150 tons a day.

In connection with the production of much needed fertilizing substances, a great supply of which has usually been imported for use on the farms of the country, an immense electric power plant is also under construction at the same point. The first structure of this group, the Wilson dam, when finished is expected to generate from 200,000 to 600,000 horsepower of electric energy. Although power is the prime reason for the existence of the dam, it is planned with a view to make navigable the river in which it stands for all-year-round commerce over this section. The shoals which give the place its name are so formed that the stream varies between a flow of 7,350 feet a second during low stage to almost 500,000 feet in flood seasons. Such changes in the volume of water usually take place in remarkably short spaces of time.

Other dams included in the designs for the project are intended to act as auxiliary structures to the Wilson dam, which will serve as a barrier to the entire width of the river. It is approximately one mile in length, covers twenty acres of ground, and the lake it creates will extend upstream for a distance of eighteen miles. Concrete and masonry contained in the gigantic dam comprise 36,000,000 cubic feet, sufficient material for a solid concrete road, sixteen feet wide and six inches thick, stretching from New York to Chicago. The main wall of the barrier rises to a height of 137 feet above the foundations. Besides the structures already under way, power plants



Constructing Gigantic Cement Wall of Wilson Dam Which Is to Form Eighteen-Mile Lake in River

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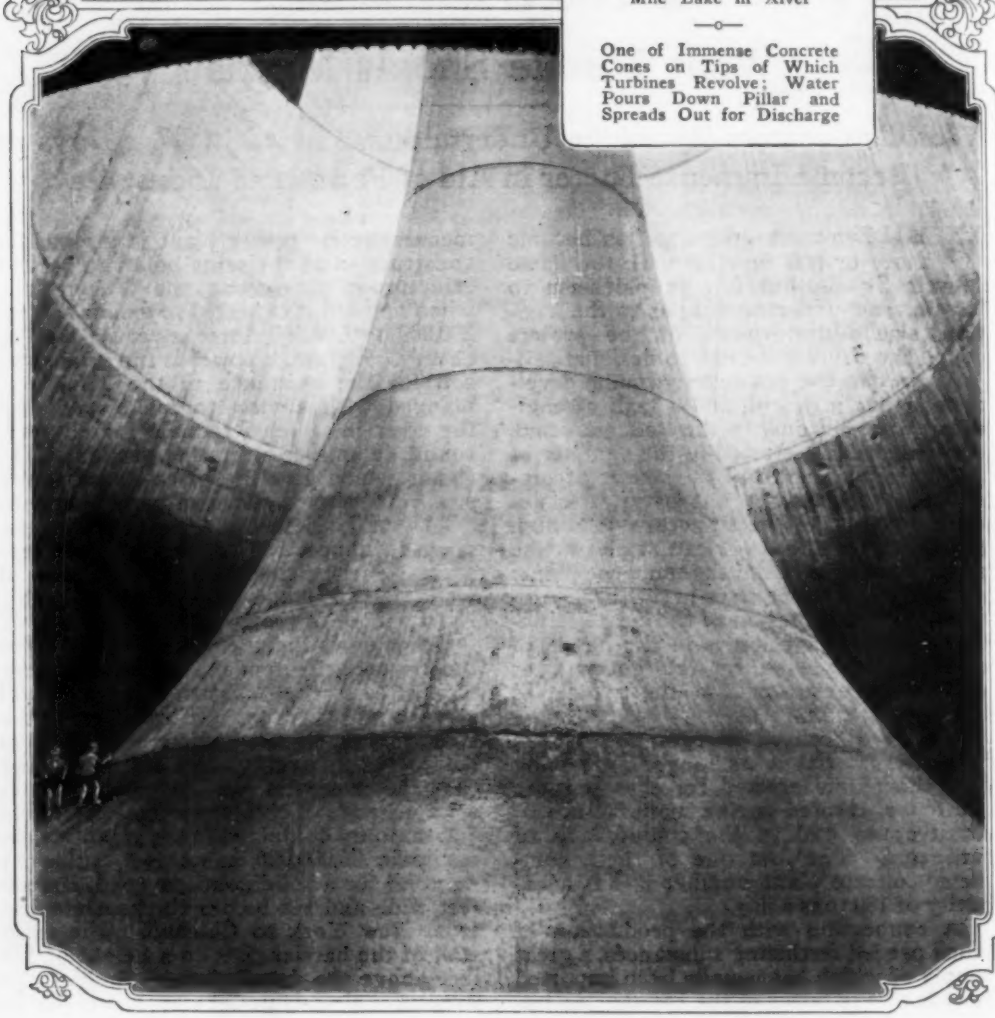
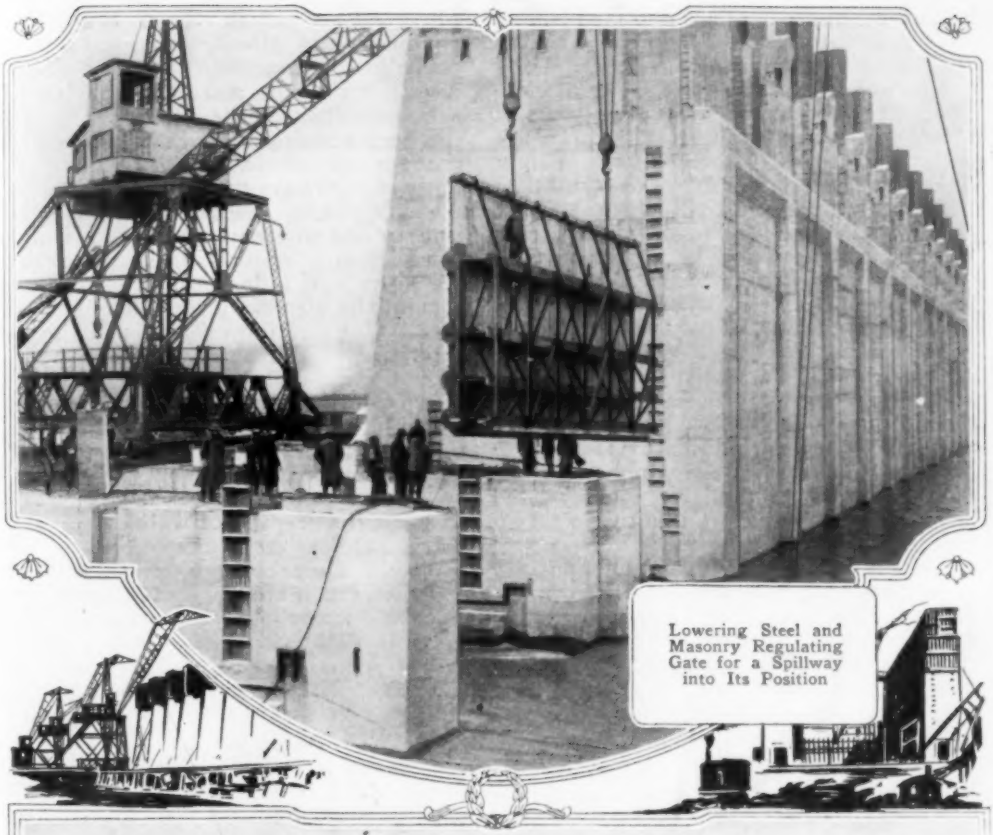
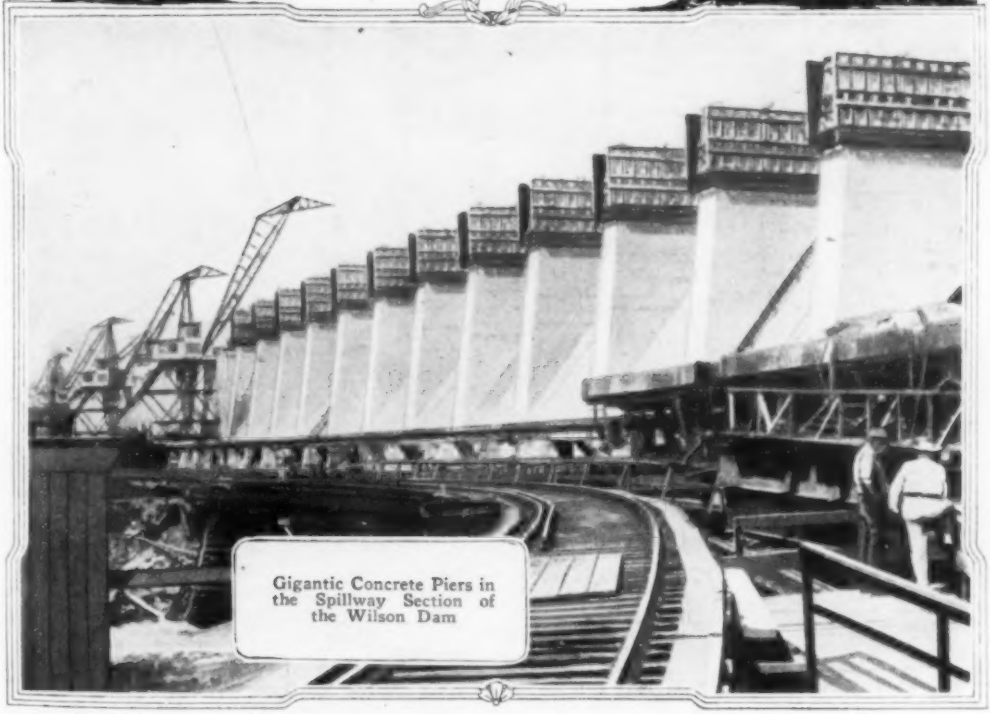
One of Immense Concrete Cones on Tips of Which Turbines Revolve; Water Pours Down Pillar and Spreads Out for Discharge





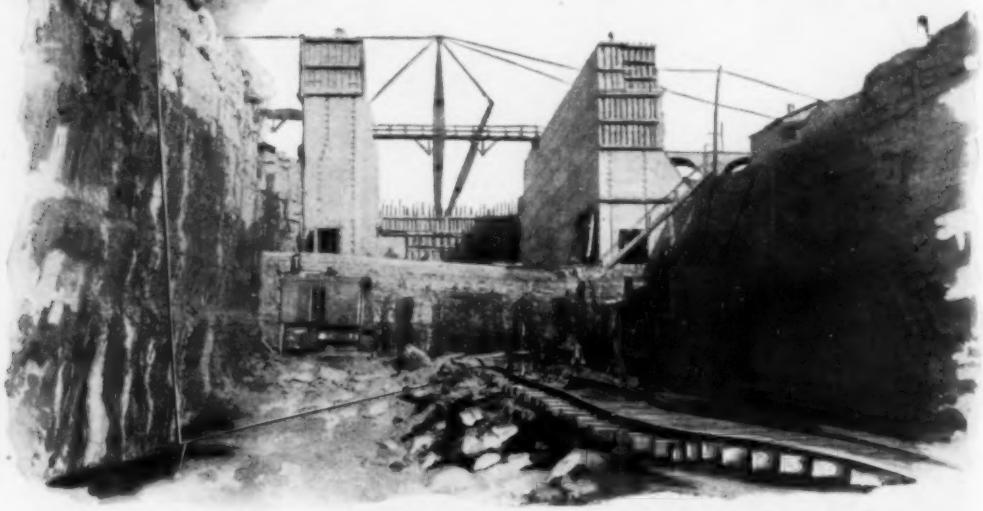
Lowering Steel and Masonry Regulating Gate for a Spillway into Its Position



Gigantic Concrete Piers in the Spillway Section of the Wilson Dam

run by an upper dam are designed to add greatly to the output of the main plants at the Wilson dam, bringing an estimated production of 800,000 horsepower of electric energy that could supply the needs of about twelve surrounding states. In the nitrate plants two processes, one mainly dependent on the supply of air, the other using coal, limestone and air, are believed to be sufficient in production of fertilizing materials for the needs of almost any demand. To house the workers employed in the industries two large villages have been built at a cost of $16,000,000. These communities are well equipped with schools, hotels, hospitals, public utilities and all modern improvements found in the most up-to-date cities. Besides, eighty-five miles of navigation improvements will make possible further development of the upper reaches of the river country by bringing water transportation to the aid of industries and agriculture.

Although efforts to plan profitable improvements in the Tennessee river at Muscle Shoals and adjacent areas traversed by the stream have been made for the last hundred years, it was not begun until science, searching for methods of making nitrates from materials abundant in that locality, discovered a means to turn the natural resources and formations of the river to valuable uses. Government engineers had already surveyed and reported on the availability of Muscle Shoals district for a dam and power plant when the necessities of the great war inspired the beginning of the work. With slight changes and additions to the original plans, these experts have turned the development from a source of essential explosive chemicals to one whereby not only agriculture can be greatly assisted, but also neighboring cities and industries for many miles around the gigantic project may be benefited. One striking operation in the performance of the work of preparing the ground for the big Wilson dam, consisted of what has been termed "geological dentistry." In sounding the soils underlying the rocky bluffs which abut on the river, it was found that large "pockets" or deposits of absorbent clays were so situated as to assist the seepage of water, that might result in disaster to the success of the project. Tunnels were driven into the walls of the bluffs, one being run 1,400 feet beneath the top of the ground. From these drifts the clay pockets were reached, the soft soil removed from its beds and the holes filled with concrete, much as a dentist fills a tooth cavity. This treatment resulted in a considerable strengthening of the earth at that point, besides providing a watertight and resistant barrier against dangerous seepage or leakage of water around the dam abutments or the powerhouse foundations on the land end of the work. This is but one of the huge engineering tasks whose results will be concealed when the project is completed.



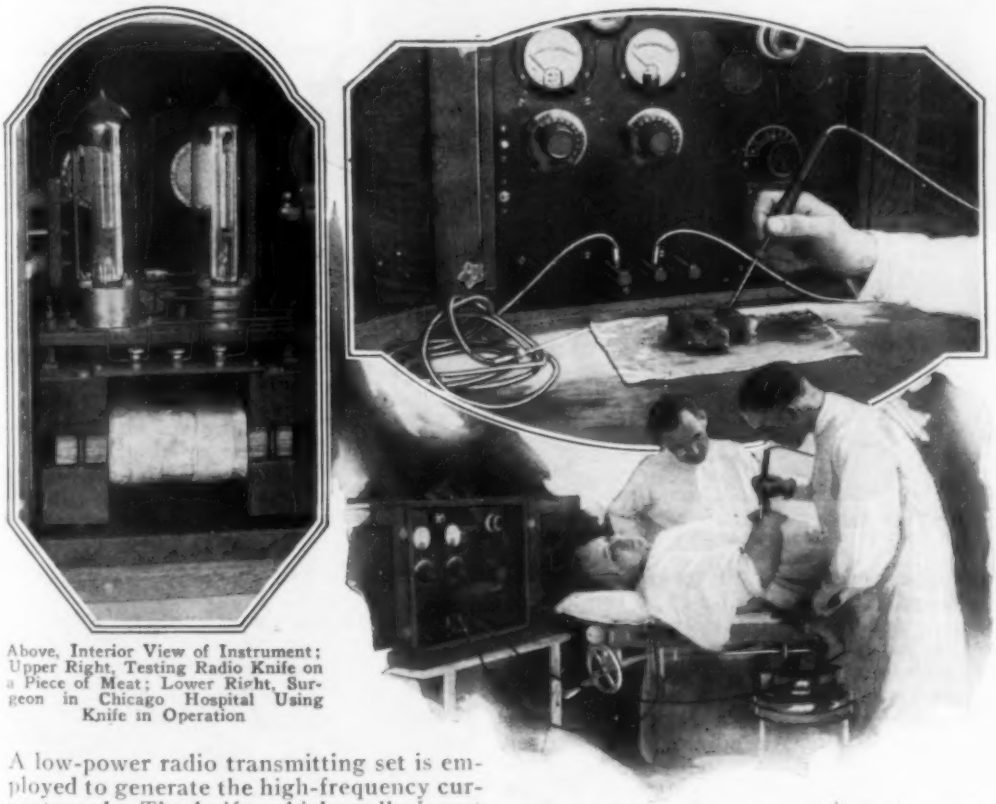
One of the Locks of Wilson Dam That Will Be the Means of Putting the Upper Reaches of the Tennessee River into a Great System of Water Traffic

RADIO

Bloodless Surgery with Radio "Knife"

Radio has entered a new field—that of surgery, and bids fair to find a permanent place there. Recently, in a Chicago hospital, an entirely new instrument, the radio "knife," made its appearance, and, in the hands of the inventor, a well-known surgeon, demonstrated its ability to sever human tissue with the minimum loss of blood. As explained by a representative of the laboratory in which the new device was developed, the theory is very simple. A low-power radio transmitting set is employed to generate the high-frequency current used. The knife, which really is not a knife at all, but looks more like a heavy knitting needle, forms one terminal. The other terminal is a plate on which the patient is laid. The human tissue offers resistance to the passage of the current when the knife is applied, and the resulting heat, it is said, causes the knife to burn its way through skin, fat and muscle as easily and with as little necessity for pressure as though it were passing through butter instead of flesh.

The inventor, in the course of the demonstration, operated on two men afflicted with cancer of the bladder, and the blood resulting from the severing of the tissue might have been caught in a few tablespoons. It is anticipated that the new instrument will cause a small revolution in the operative treatment of certain diseases, especially cancerous growths.



Above, Interior View of Instrument; Upper Right, Testing Radio Knife on a Piece of Meat; Lower Right, Surgeon in Chicago Hospital Using Knife in Operation

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¶In the United States there are 3,000 manufacturers of radio supplies, 1,000 wholesale distributors and jobbers, and 25,000 retail dealers.

Stations Logged on Dials

Radio fans will welcome the calibrating device shown in the photo by which the various stations can be logged on the dials so that tuning is made much easier. The device consists of a cardboard disk about ½ in. larger in diameter than the dials. It has radial slots cut along the edge so that small pieces of paper marked with the various stations can be inserted. The face is covered with thin transparent celluloid and the disk is fastened to the underside of the dial. Of course, the tuning varies with different sets as well as with distance and location, and therefore each must be calibrated by its owner. This is done by first tuning in a station and, using the zero mark as a pointer, noting over what slot it lies. A small strip of paper with the call letters of the stations printed on it is inserted in this slot and the same thing done to all the dials. In this way a permanent record is made, and the stations thus logged should readily be tuned in at any time; there is, however, always the possibility that atmospheric conditions may be encountered that will make slight changes in the settings necessary.

New York Radio Fan Invents Novel Calibrating Device Which Enables Stations to Be Logged on Tuning Dials

Radio Beacons to Guide Airmen

Recently the bureau of standards, in cooperation with the U. S. signal corps and the air service, has developed a means of increasing the safety of both aerial and marine navigation which is of special value in fog, when lights are practically useless.

The method is briefly as follows: At lighthouses, in the case of marine navigation, or at stations along a particular route, in aerial navigation, ordinary radio transmitting sets are installed. Two antennae of the coil or loop type are used with each set. These antennae consist of single turns of wire, each in the form of a vertical rectangle about 100 ft. long and 50 ft. high, crossing each other at an angle of 135 degrees. The transmitting set is connected alternately to each coil. As this type of antenna transmits a maximum signal in one direction, and practically no signal in a direction at right angles to the first, a receiving set located along the line bisecting the angle formed by the crossed coils will receive signals of equal intensity from each antenna. If the receiving set is on an airplane or ship, a straight course can be maintained by navigating so that the two signals always remain equal in intensity. Such a course evidently may be steered regardless of visibility.

The system has been found quite reliable and offers great promise, especially for cross-country aerial navigation. An airplane was recently guided into Dayton, Ohio, from a station 100 miles away, by means of the signals from a "beacon" of this type. The new invention can also be used on rivers and crooked channels, to supplement the range lights now employed.

¶The simplest method of testing a radio headset for sensitiveness is to fit the phones over the ears in the usual way, and place the cord terminals on the tongue. Good phones will respond with a loud click, but inferior ones will not.

Switch for Both Batteries

Filament batteries should be turned off and the phone or loud-speaker plugs pulled out of the jacks when the set is not in use. This is often forgotten at the close of the evening's entertainment, with the result that the battery is discharged, sometimes overnight, and the fact is not discovered until it is too late. Many sets are fitted with a filament switch on the panel and it is a simple thing to use it. On sets having no such switch, a single-throw double-pole knife switch should be installed to cut off both A and B-batteries, one side of the switch being used for each battery circuit. This arrangement also permits making adjustments and repairs without danger of blowing tubes.

Novel Window-Shade Antenna

An unusual and effective indoor aerial may be made by sewing the wires around the edges of an ordinary window shade, as shown in the photo. The ends of the wires terminate in binding posts attached to the slat in the bottom hem of the shade, and connection to the set is made as with any loop aerial. The antenna can be hung in the window like a shade, where it will be inconspicuous, or, as in the case shown in the photo, it may be mounted on a special stand. An aerial of this type takes up very little space when not in use,

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Aerial Sewed on Window Shade Is Latest Fad in Indoor Antenna

and is said to be very efficient. The wires selected should, of course, be as flexible as possible, so as not to interfere with the rolling of the shade.

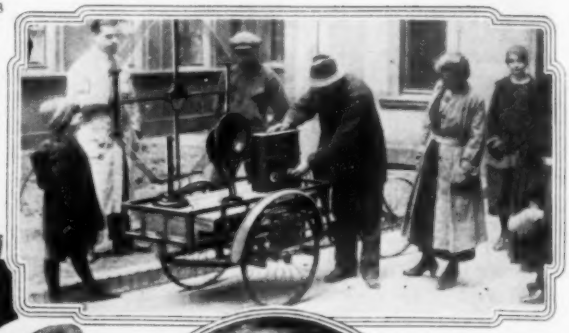
Radio "Pinch Hits" for Orchestra

Radio came to the rescue when the orchestra failed to appear for a dancing performance at Aeolian Hall, New York, recently. Florenz Tamara and Addison Fowler, originators of the "Tamara Tango," who were the artists on the program, were not defeated when it was discovered that there was no music. They communicated with station WJZ and made arrangements to have the station orchestra broadcast a program of dance music. They then installed a radio set and loud speaker on the stage, and, in spite of the fact that they did not know what numbers the orchestra was going to give them, danced to the complete satisfaction of the huge audience. This is said to be the first time that radio has been employed in this manner on the public stage.

Florenz Tamara and Addison Fowler Dance to Radio Music at Public Performance When Orchestra Fails to Appear

Broadcasting Nightingale's Song

One of the latest innovations in radio entertainment is the broadcasting of songs and cries of wild birds and other animals, a feature begun in England by a British broadcasting company. Microphones are placed in the groves frequented by the nightingales and their song is relayed from London. The birds were induced to begin their "concert" by an artist playing a few soft notes on a cello.



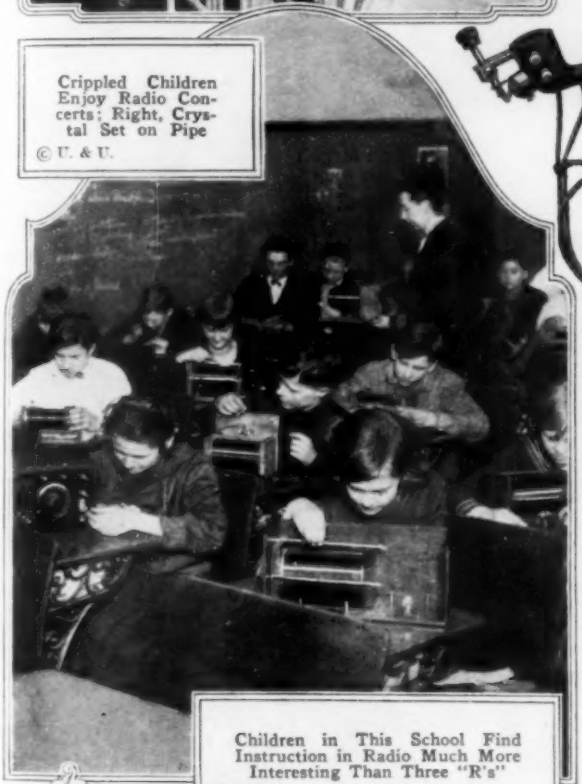
Radio Man Replaces Organ Grinder; Left, Radio Hat Latest Summer Fad
© U. & U.

Radio in Car Finds Power-Line Trouble

Listening to Radio Concert in Tunnel 120 Feet Underground in Coal Mine

Left, a Truly Portable Set; Right, Love's Young Dream
© U. & U.

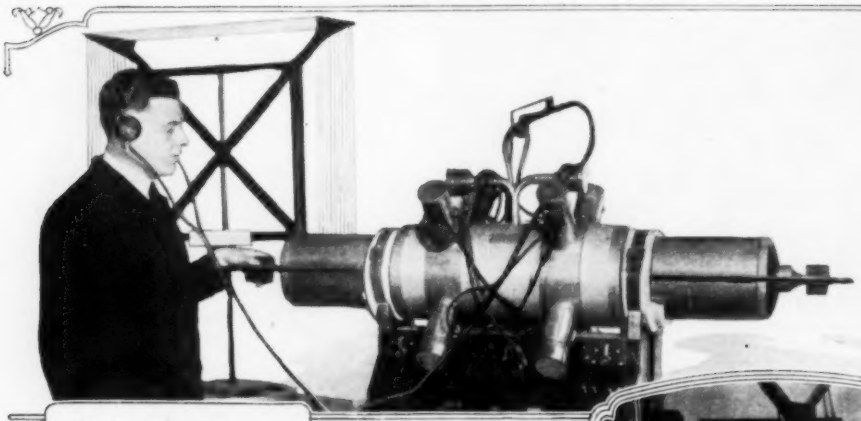
Crippled Children Enjoy Radio Concerts; Right, Crystal Set on Pipe
© U. & U.



Children in This School Find Instruction in Radio Much More Interesting Than Three "R's"
© U. & U.

Small Crystal Set Mounted on Ring

Left, Broadcasting Heartbeats; Right, Elevator Man Listens In

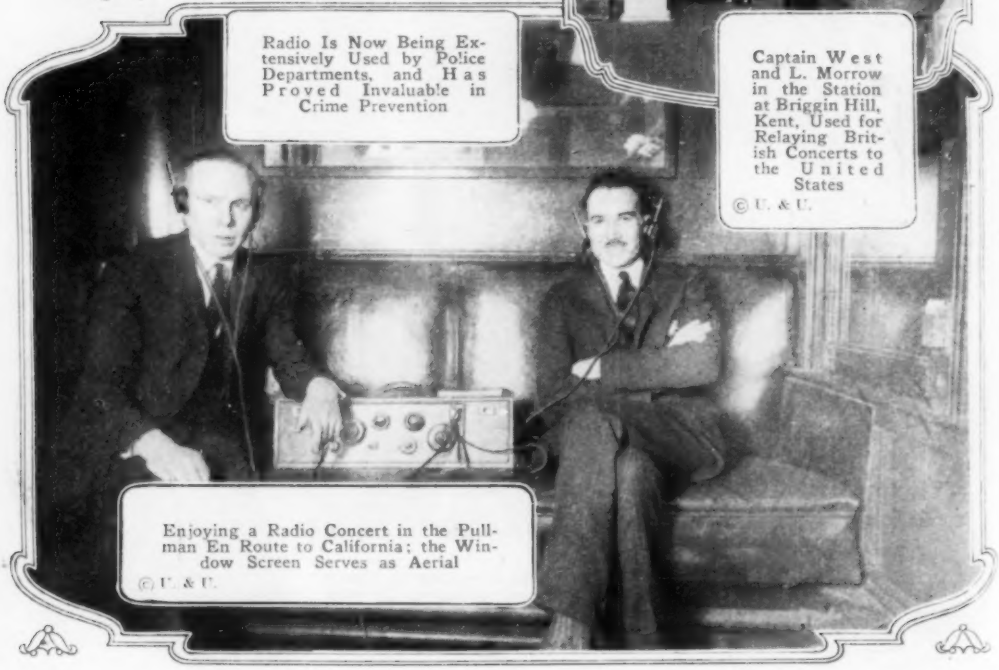


E. L. Luke Demonstrates the Scotch "Clariphone," the Only Absolute Static Eliminator Known

Captain West and L. Morrow in the Station at Briggin Hill, Kent, Used for Relaying British Concerts to the United States

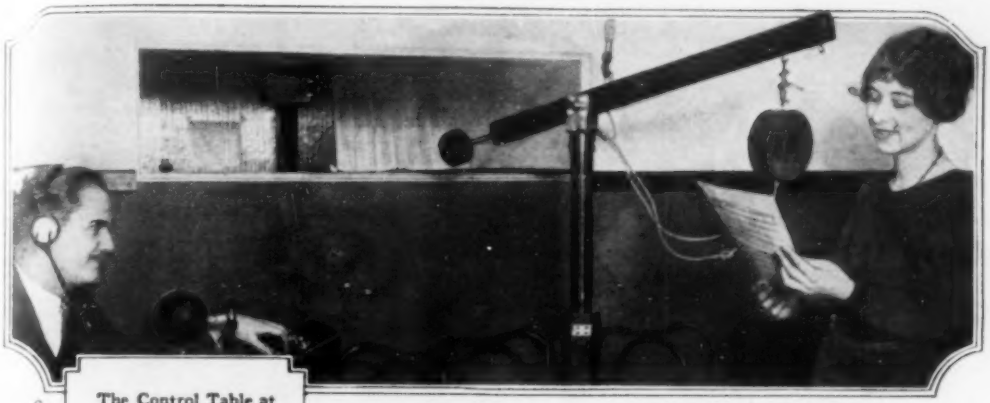
© U. & U.

Radio Is Now Being Extensively Used by Police Departments, and Has Proved Invaluable in Crime Prevention



Enjoying a Radio Concert in the Pullman En Route to California; the Window Screen Serves as Aerial

© U. & U.



The Control Table at KYW, by Means of Which the Operator Can Amplify or Reduce the Volume of the Voice

This Life-Saver Keeps 'Em on the Beach with His Radio Set, So That They Can't Drown

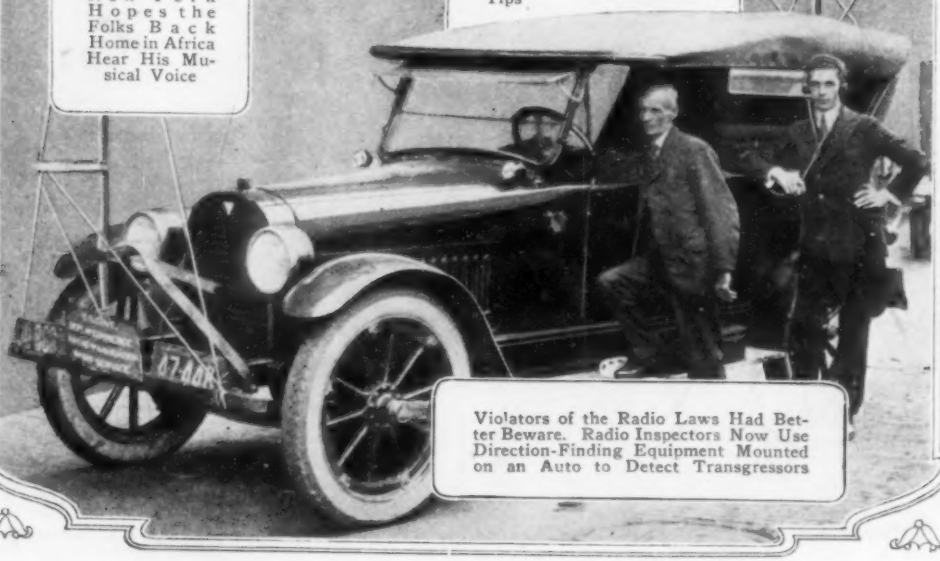
Left, the "Radio Girl" at the University Forum Ball in New York; Center, the Radio Necklace, a New Fad That Should Prove Popular with Fair Fans; Right, Mary Pickford and "Doug" Fairbanks, the Nation's Foremost Movie Celebrities, Making Their Radio Debut

© Underwood & Underwood

This "Radio-Mad" Orang-Utan in the Bronx Zoo in New York Hopes the Folks Back Home in Africa Hear His Musical Voice

"Oranges and Lemons, Say the Bells of St. Clement's"; Broadcasting the Famous Chimes in London
© U. & U.

Harry Dufony, of Jersey City, Is Deaf, but He "Hears" the Radio Concert through His Finger Tips



Violators of the Radio Laws Had Better Beware. Radio Inspectors Now Use Direction-Finding Equipment Mounted on an Auto to Detect Transgressors

Loud Speaker for Open-Air Concerts at Leipsic Fair

Theresa Smith, Flo Chaumont and Hazel Stanley Dancing to Music by a Monster Loud Speaker at the New York Show

© U. & U.

The Famous Orchestra of the Hotel Cecil, London, Heard Recent'y by Radio Fans in This Country

Above, the Latest Novelty—the "Felix the Cat" Crystal Set; Right, Miss Frances Meyer Accompanies the Music Received on Her Loud Speaker on the Piano

Ship's Operators Play Chess by Radio

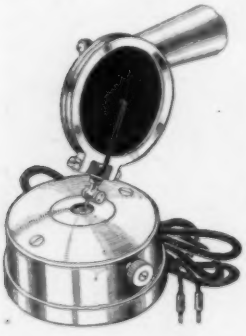
F. E. Black, chief operator of the steamship "America," has solved the problem of how to pass the hours off watch, by indulging in a friendly game of chess with the operator on another ship.

Playing a Game of Chess at Sea with an Operator on Another Ship

The procedure is simple. He simply announces his play by code, the other operator shifts the men on his board to suit, studies the situation, then announces his move. Here is a hint for shore-going "hams"; when all the traffic is "off the hook," and the night is still young, call up a brother and indulge in a game of chess.

Phonograph Loud Speaker Uses Novel Principle

Heretofore, when the radio fan desired to use his phonograph as a loud speaker, it was necessary for him to remove the reproducer, and to apply special fittings to enable him to connect his ear phones to the tone arm. Now, however, an instrument is available that makes it unnecessary even to remove the reproducer and dispenses with the phones also. The new instrument is really a phone playing through the needle of the phonograph. It is simply laid down on the turntable of the machine and the needle of the reproducer set down on its center exactly as it is usually set in the grooves of the record. The tone vibrations are transmitted through the reproducer disk in the same manner as are those of the record. As the new instrument has no thin metallic diaphragm, it is said that it is free from harsh metallic notes. No external battery or special hookup is required; a cord is furnished with each unit and is attached to the set in the same way as a headset.



New Method of Broadcasting

Radio broadcasting and receiving may be influenced considerably by a new method of broadcasting being tried out by station WRM, the University of Illinois, Urbana. Recent tests have brought responses from all over the United States to the effect that the signals came in loudly and clearly, without the usual interference caused by static and "strays." The efficiency of the new method is due to the elimination of the "carrier wave," and the advantages claimed for it are greater selectivity, greater range and clearer reception.

Double-Grip Battery Clip

Durability and convenience are the two outstanding features of a novel battery clip now on the market. It has no delicate connections to get out of order but is of rugged construction throughout, consisting of two pieces punched and bent as shown, with a stout coil spring between them to keep the ends tightly together. To attach the clips the center portion is compressed.

Tester for Filament Circuit

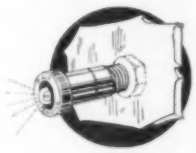
Insertion of vacuum tubes into the sockets of homemade radio sets is always dangerous to the tubes the first time, as the circuit wiring may be incorrect, bringing a high voltage to the filament prongs of the sockets and causing the tubes to blow out. It is therefore advisable to protect the tubes by testing the filament circuit before inserting the tubes in the sockets.

A simple tester for this purpose can readily be made from the base of an old burned-out tube and a miniature electric-

lamp socket, the terminals of which are wired and soldered to the filament prongs of the tube base. The miniature socket can, if it is small enough, be fitted inside of the base shell and held in place by means of sealing wax. Flashlight lamps of different voltages, corresponding to the filament voltage of the tubes to be tested, are used in the socket, and the device is inserted into the tube socket on the set and the current turned on. Too high voltage will then burn out the small lamp, which is much cheaper to replace than a vacuum tube.—A. C. Cole, Chicago, Ill.

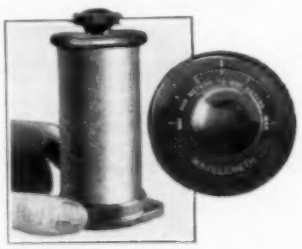
Protective Unit Prevents Shorts

Blowing out of tubes, due to accidental short circuits while tinkering with the set, may be prevented by the use of a simple signal and protective unit now on the market. The unit is made in two types; one to take the place of a regular binding post, the other to replace an ordinary A-battery switch; both types are mounted on the front of the panel and contain a small lamp that lights as soon as a short circuit develops, thus warning the operator immediately. By using these units it is said that the necessity for protecting the filaments by means of fuses is avoided, as one unit will protect any number of receiving tubes, of any type.



Transformer Is Adjustable for Wave Length

Heretofore radio-frequency transformers have been made only in the fixed style, that is, they were fixed at a certain wave length by the manufacturers, and although they were supposed to cover a wave band of 200 to 600 meters, they actually were efficient only at the wave length to which they were adjusted. Now, however, comes a transformer by means of which maximum amplification can be obtained at any wave length merely by adjusting the instrument by means of a wave-length dial mounted on the top.



Making Electricity Speak

The greatest difficulty has generally been experienced in making any mechanism that will successfully imitate the human voice (leaving out of consideration the phonograph, which reproduces mechanically a real voice). Although many attempts have been made in the past to produce a voice by mechanical means, none have been entirely successful. Toward the close of the tenth century, Pope Sylvester II is said to have constructed a brazen head which answered questions, and similar inventions are ascribed to Albertus Magnus, Roger Bacon and others. In the first half of the seventeenth century the philosopher Descartes made a speaking figure, which he called his daughter Franchina, but the superstitious captain of a vessel had it thrown overboard. In the latter part of the eighteenth century, a speaking machine made by Fabermann of Vienna closely imitated the human voice, with a fairly good pronunciation of various words.

Electrical Equipment Using Vacuum Tubes to Produce Artificial Speech

This problem now seems to be nearing solution with the assistance of the vacuum tube. A new machine, invented by Dr. Harvey Fletcher of New York, uses a combination of oscillator and amplifier, and with it a loud speaker is made to pronounce the vowel sounds " A, E, I, O, U" and the words "papa" and "mama" in an unmistakable manner. The inventor hopes soon to be able to operate the instrument so as to speak whole sentences.

¶A telephone line 100 miles long connects a radio studio in the Hotel Brunswick, Boston, Mass., with station WBZ, Springfield, Mass. This is the first studio to be located at such a distance from the broadcasting station.

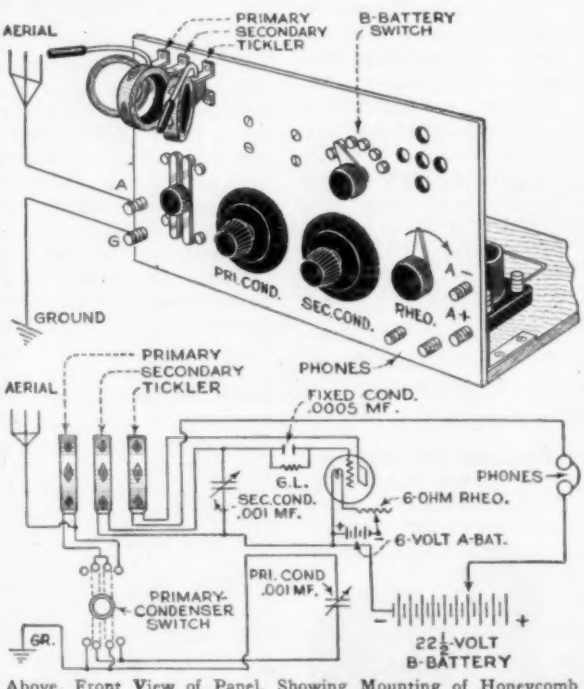
Building a Honeycomb-Coil Receiver

By F. L. BRITTIN

A HONEYCOMB-COIL receiver has one decided advantage over other receivers for experimental purposes, in that the coils are interchangeable, permitting the operator to tune to any desired wave length. In addition to this, the circuit will receive both damped and undamped waves, and the coils take up much less room than other types, and are very efficient. Each coil is mounted on a plug, designed to be used with a coil mounting; these mountings are obtainable in various styles, the one used in the circuit described here being of a standard type, in which the center coil is stationary, and the two outer ones fitted with trunnions, permitting the operator to move the coils, for the proper coupling and without body-capacity effects, by means of the handles.

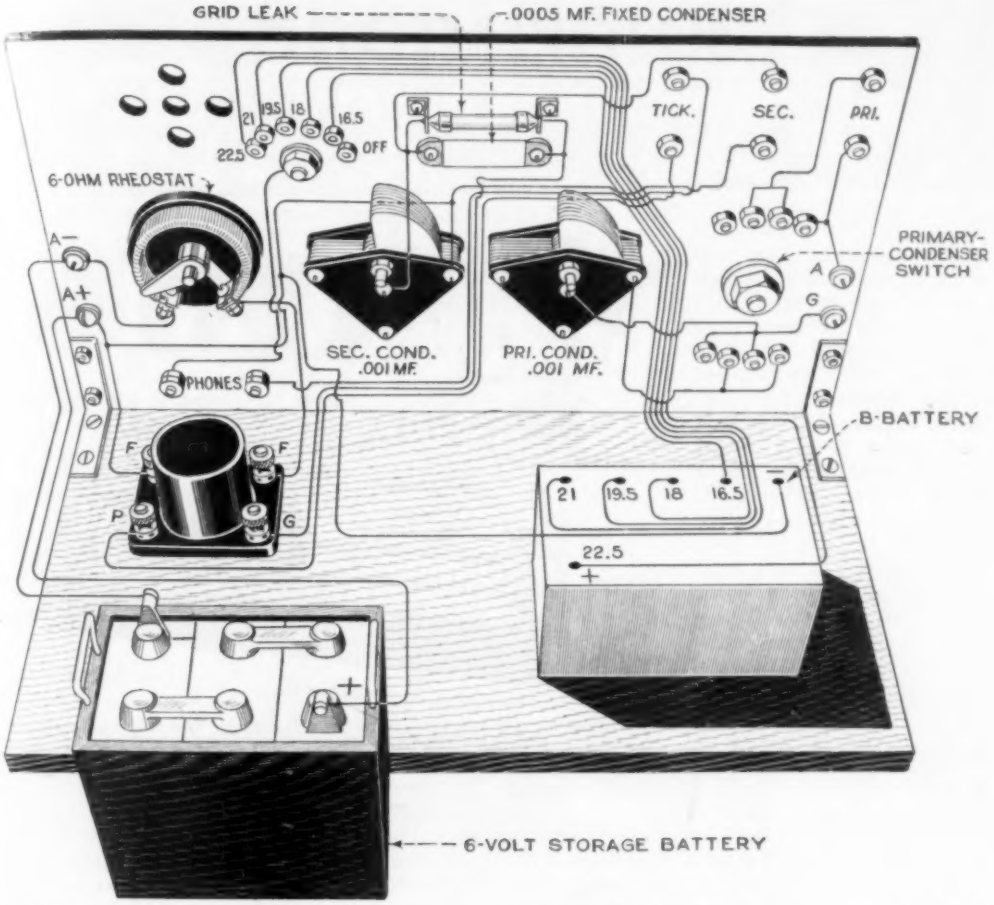
The instruments are mounted on a bakelite panel, 3/16 by 8 by 14 in. in size. This panel is mounted on a ½ by 6 by 14-in. wooden base by means of two angle irons. The completed instrument can, of course, be fitted in a cabinet if desired; in this case, however, the baseboard should be made a little shorter than the panel. At the upper right-hand corner will be noted the machine-screw terminals for the honeycomb coils; immediately below is the primary-condenser switch—a double-lever switch with eight contact points, for the purpose of switching the primary condenser from a series to a parallel connection to the ground, and thus enabling the condenser to be used for both short and long waves. The primary condenser itself is shown at the left of the switch, and the variable condenser that is connected across the secondary coil, at the left of the primary condenser. Immediately above these condensers the grid condenser and grid leak are mounted; the grid condenser is of .00025-mf. capacity, and the leak of 2-meg. resistance. If one has not a standard leak at hand and does not desire to purchase one, a satisfactory one can be made by making a mark with a soft lead pencil on a small strip of cardboard or fiber, and mounting the strip by means of two small machine screws in the same manner as the standard leak; the pencil mark, of course, should make contact with the screws. It is much better, however, to use a standard leak, preferably a variable one.

At the left of the grid condenser is the switch for tapping off the B-battery; this has six points, one being the off point. The switch lever should be kept on this point when the instrument is not in use. The wires should be soldered to the contact points on all switches. The rheostat is shown at the left side of the panel, and is an ordinary 6-ohm rheostat of the panel-mounting type. The phone binding posts are mounted just below the rheostat, and at the left edge of the panel the binding posts for the 6-volt A-battery are placed. The tube socket is placed on the base just at the rear of the rheostat. The aerial and ground binding posts are placed at the right side of the panel. The wiring is done with No. 18 insulated fixture wire; bare, tinned copper wire may be used, and covered with "spaghetti" tubing, if desired. The tubes best adapted for this circuit are the UV-200 or C-300, 6-volt detector tubes.



Above, Front View of Panel, Showing Mounting of Honeycomb Coils; Below, Wiring Diagram for Checking Purposes

All joints in wires should be soldered, using a good non-corrosive flux. After the



Back View of Panel and Baseboard, Showing All Connections and Position of the Instruments: Note Particularly the Wiring of the Primary-Condenser Switch

instrument has been tested, and found to work satisfactorily, the connections of the wires to the screws of the binding posts should be made permanent by soldering them also.

The various coils to use for the different wave lengths are as follows:

Wave Length	Primary	Sec.	Tickler	Condenser
150-350	50	50	25	Series
450-1,050	150	150	75	Series
835-1,950	250	250	150	Series
1,760-4,000	500	500	250	Series
5,200-12,500	1,500	1,500	600	Series
12,000-20,000	1,000	1,000	1,250	Shunt

The best type of aerial to use with this receiver is one or two wires 125 to 150 ft. long, and from 35 to 50 ft. from the ground.

The materials required consist of:

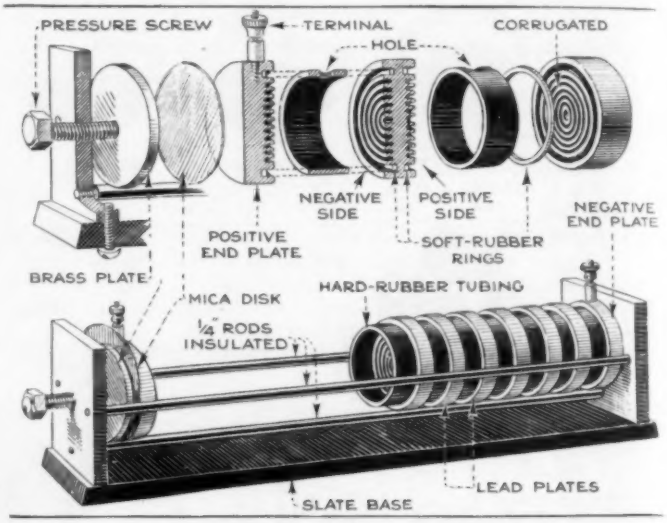
1 bakelite panel, 3-16 by 8 by 14 in.
1 base, ½ by 6 by 14 in.
1 set of honeycomb-coil mountings.
2 .001-mf. variable condensers.
1 .00025-mf. fixed condenser.
1 2-meg. grid leak.
1 6-ohm rheostat.
1 UV-200 or C-300 tube.
1 tube socket.
1 primary-condenser switch, double-blade type, with contact points.
1 switch lever.
6 contact points.
6 binding posts.
2 angle irons.
1 6-volt storage A-battery.
1 22½-volt B-battery.
1 pair 2,000-ohm headphones.
Honeycomb coils as indicated in text.

Soldering Radio Leads

In soldering the leads on my radio set, I found it rather difficult to hold the wire securely at the proper height and angle while applying the solder, as both hands were occupied, one holding the solder, and the other the copper. The difficulty was easily overcome, however, by building up a stack of books and slipping a part of the wire between the leaves of the topmost book to hold the end in position.—H. E. Benedict, Chicago, Ill.

Compact Storage B-Battery

Compactness and simplicity are the features of the B-battery shown in the illustration. It consists of a number of concentrically grooved lead disks separated by narrow hard-rubber rings cut from rubber tubing ⅛-in. thick and 2 in. in diameter, as shown. The grooves on one side of the disks are filled with a paste made of red oxide of lead moistened with a 10-per-cent solution of sulphuric acid, forming the positive plate, and those on the other side with yellow oxide of lead moistened in the same way, forming the negative plate. Thus each disk is the positive and negative plate of two adjacent cells and also serves as a wall separating these cells. This construction does away with external connections between the cells and with binding posts on each of them. The grooves can be made in the lathe, but if a large number of disks are to be made it is better to cast them in a mold.



Construction and Details of Homemade B-Battery Which Does Away with External Connections between the Individual Cells

The battery of cells is held together in a frame, consisting of a slate base with wooden endpieces and three ¼-in. rods covered by glass tubing and screwed into the endpieces, by means of a clamping screw at one end, a mica disk and a brass disk being provided at both ends as shown. This assembly is practically acid-proof. A binding post is mounted on each of the end disks, one being the positive and the other the negative terminal of the battery.

A ¼-in hole is drilled in the top of each separating ring so that hydrometer readings of the electrolyte can be taken and distilled water added as needed. This hole is tapped for a small screw, which in turn has a pinhole drilled through it to allow gas to escape from the cell.

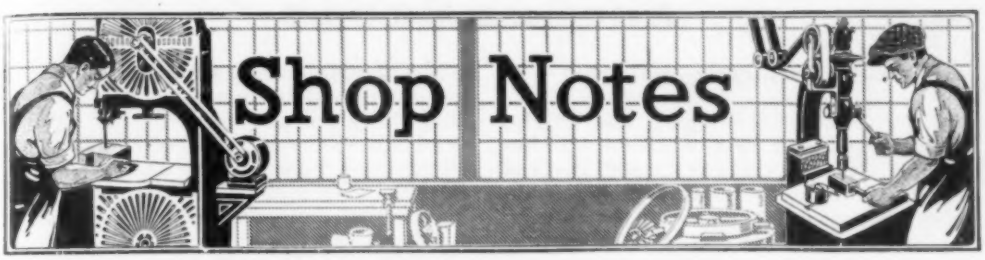
The electrolyte consists of 1 part sulphuric acid and 1½ parts water, by volume, which will give a specific gravity of approximately 1.400. Enough distilled water is then added to reduce this to 1.300. The solution should be mixed in a stone or porcelain jar, the water being poured in first and the acid added slowly. This order should be strictly observed as it is dangerous to mix acid and water in any other manner.

Each cell will give a potential of approximately 2 volts so that only half as many cells are necessary as the number of volts desired.

The size of the cells can be made very small by reducing the width of the hard-rubber rings. Varying the size of the cells by decreasing or increasing the plate area does not affect the voltage of the battery but it does determine its life, that is, the number of ampere-hours it will yield. After assembling, the battery should be filled with electrolyte and given a 1-amp. charge for 10 hours, then immediately discharged through a resistance. This should be repeated four or five times, when the battery will be ready to hook into the circuit.

Australian Sets Are Sealed

To protect broadcasting stations, the Australian wireless authorities require all radio sets to be sealed after they have once been correctly adjusted for the wave length of the broadcasting stations they are to receive. In order to purchase a receiving set in that country, the prospective owner must first subscribe to the service of a broadcasting station, for which he is charged a certain fee, and then present his certificate of subscription to the radio dealer from whom he buys the set so that it can be adjusted and sealed. If he desires to listen in to additional stations on other wave lengths, he can have the set adjusted and sealed to cover the different ranges, provided, of course, he shows subscriptions to each station.



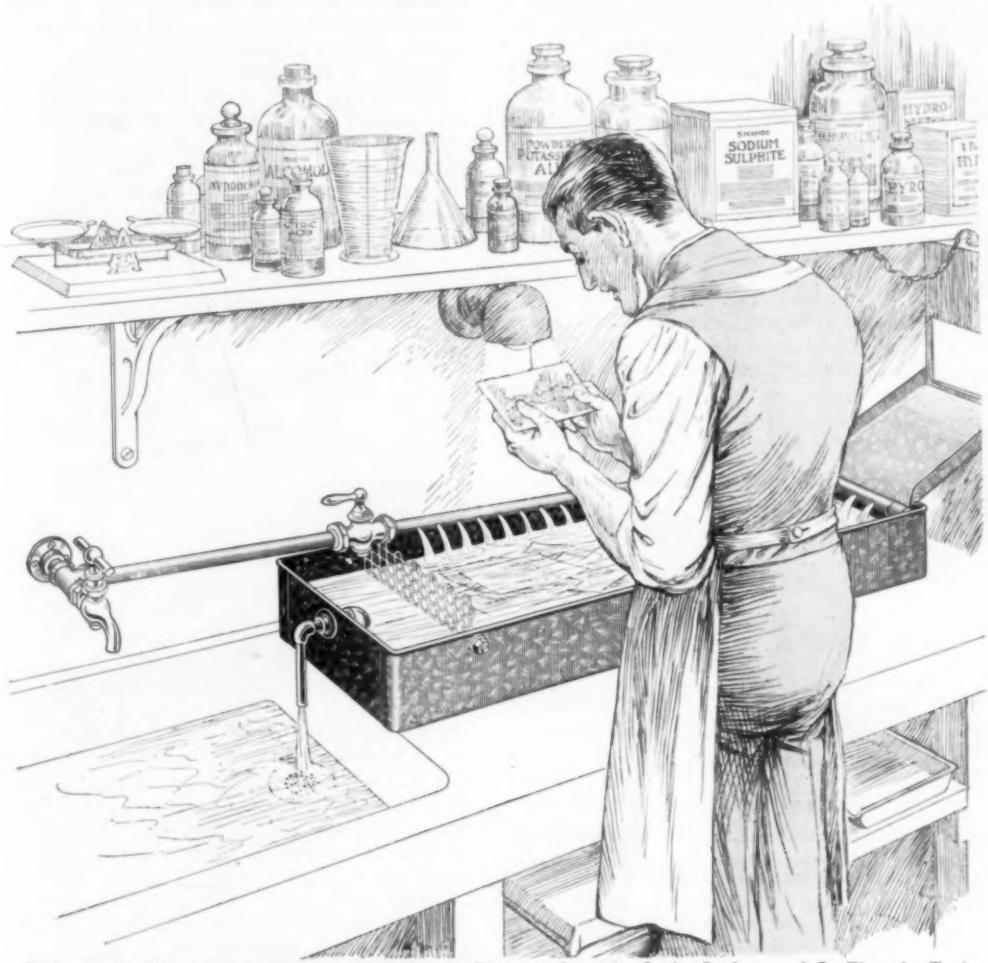
All Shop Notes published in 1923, in book form—Fifty Cents—from our Book Department

Washing Tank for Films and Prints

By EDW. H. FLAHARTY

VERY often the photographer, even the professional worker on a small scale, encounters difficulty in finding a suitable method of washing his films, plates and prints in running water without danger of scratching or creasing them.

A washing tank, as shown in the accompanying illustration, has solved the problem for one photographer. This tank can be made of any desired size and capacity to meet individual requirements and particular conditions, although the dimensions given below will be found suitable for most purposes. First a tank is made of gal-



Easily Made Film and Print-Washing Tank for the Photographer; the Outlet Is Arranged So That the Tank May Be Made to Empty and Refill Itself Automatically

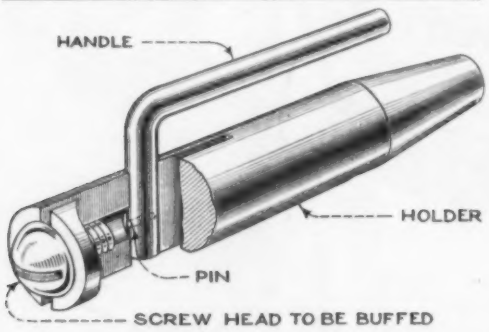
vanized sheet iron, measuring about 4 ft. long and 8 in. deep. The corners are soldered to insure their being water-tight. The tank is placed on a board or shelf beside the sink, then a connection is made with the cold-water pipe, preferably between the tap and the end of the pipe to which the tap is connected. This may be done by means of a reducing tee, inserted between the tap and the nipple; the tee connects with a smaller pipe, which in turn is followed by a tap, corresponding in size with the pipe used, and into this tap a pipe is screwed which runs along the entire side and one end of the tank, or it may be made to circle the tank. This pipe has small holes drilled into it a few inches apart, which permit an even spray of water to play over the tank, causing a slight but continual agitation of the water.

The outlet of the tank is arranged so as to give two methods of emptying the tank, and is in the form of a 1-in. pipe connection which drains into the sink. About 1½ in. from the top of the tank a hole is cut and a 1-in. bushing soldered into the hole. A connection, the inlet of which comes at the bottom and on the inside of the tank, is formed by a short piece of pipe leading horizontally from the bushing, then an ell pointing down, to which is connected another piece of pipe. The short piece of pipe leading into the fixed bushing is allowed to remain a little loose so that the piece of pipe which is attached vertically to the ell (and the ell itself) may swing from the vertical to a position nearly horizontal, thereby allowing the tank to be emptied from the bottom or from the top. This sort of connection will prevent an overflow, for after the water has reached a certain height, a siphon is automatically formed and the water drains from the tank into the sink. If the inside pipe is at an angle near the horizontal the tank will contain a large quantity of water all the time, but if the pipe is turned down straight the tank will automatically empty and refill.

To prevent prints or films from adhering to the outlet connection and causing an overflow, a screen of galvanized wire is placed a few inches from the end of the pipe, and fastened in place by small bolts and nuts, or rivets may be used as effectively. A small drain shelf of galvanized sheet iron is placed at the farther end of the tank at an angle of about 30°, directly under a red light used for viewing films and prints in the process of development. While these are being examined the dripping developer falls onto this shelf and drains into the tank. The cost of material for the tank is small, and the tank solves a troublesome film-washing problem.

Buffing Short Screw Heads

It is sometimes almost impossible to hold small articles such as screws in the fingers when polishing them on a cloth buffing wheel, owing to the drag of the wheel. Unless the work is large enough to enable the operator to secure a good hold it is nearly always advisable to use a holder, especially as the work usually becomes very hot. There are, of course, hundreds of different kinds of holders for this work, but the one shown in the illustration is worth describing, because of its quick-operating feature. The holder itself is made of round steel, tapered at one end to fit into a file handle, and having a hole drilled at the other end a trifle smaller than the shanks of the screws to be buffed. Another hole is drilled through the side at right angles to the first for a handle, which is merely a piece of round steel rod, bent as shown. The holder is then slit open from the end to a distance beyond the handle hole. The short end of the handle is drilled for a small pin, which is rounded at both ends and projects a trifle on both sides. With the tool assembled as shown, the handle is turned at right angles to spread the end so that the screw can be inserted easily, then turned back again so that the screw will be gripped firmly. The spreading is effected by the small pin in the handle. This holder grips a screw so securely that one press into the wheel polishes it. By again turning the handle as explained, the screws are dropped into a box without coming in contact with the fingers at all.

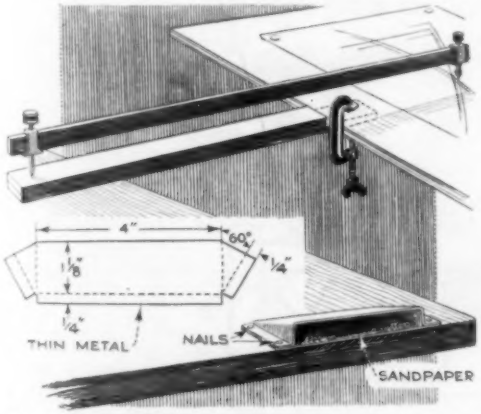


Holder for Buffing Short Screw Heads that Is Quick-Acting and Holds the Screws Securely

Two Kinks for the Draftsman

Draftsmen frequently find it necessary to scribe an arc of which the center is located outside of the drawing board. This can easily be done by the method shown in the illustration. Two 4-in. boards of a thickness equal to that of the drawing board are cut to suitable lengths, and screwed together from the underside, one being about 4 in. longer than the other. The longer one is clamped to the drawing board by means of a small C-clamp, bringing the upper surface of the shorter one level with the top of the board. The pivot point of the beam compass can then be placed wherever necessary on the extension to scribe the arc. Obviously, the extension can be clamped to the board at any point most convenient for the purpose.

Often a piece of sandpaper is attached to the corner of the drawing board in a handy position for sharpening pencils, but unless the draftsman is very careful, he is likely to get some of the pencil dust on his hands or arms and then accidentally smudge the drawing with it. This can be prevented by providing a simple sheet-metal shield, as shown in the lower detail. The sheet metal is cut and bent to the shape indicated and is tacked or screwed over the sandpaper. The longitudinal flange of the shield is bent inward and inserted under the sandpaper so that none of the pencil dust can work under it and onto the board.—Warren Scholl, St. Ignace, Mich.



Above, Extension on Drawing Board Aids in Scribing Large Arcs; Below, Pencil-Dust Guard

When grinding valves, hang a magnet on the radiator rod so that the valve pins can be stuck on the magnet. This will eliminate the risk of losing them.

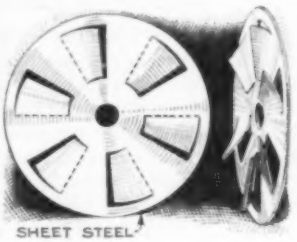
Turning Heavy Objects

Heavy objects, such as large pulleys, oil drums and the like, can be readily rolled over the floor but it is quite a difficult task to turn them around. It will be found, however, that if the area of contact is reduced by rolling the object onto a barrel stave, with the concave side up as shown in the drawing, the work of turning it around becomes comparatively easy as there is then only a small part of the stave in contact with the floor and this is in the center.—A. C. Cole, Chicago, Ill.

Easy Method of Turning Heavy Pulleys and Drums Around by Rolling Them onto Barrel Stave

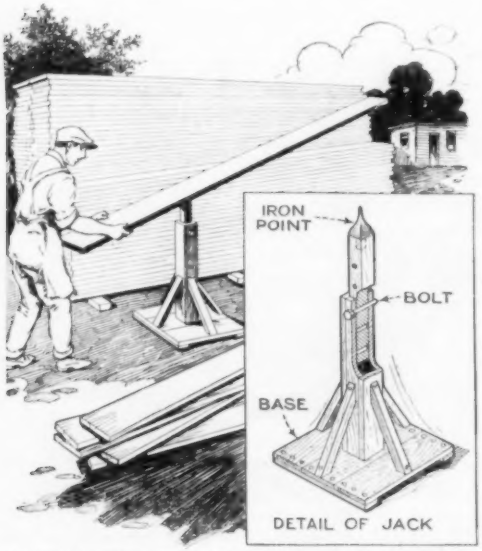
Novel Exhaust Fan

Unusual in construction, the simple exhaust fan shown in the illustration can be made from a disk of sheet metal, with radial sections cut out on three sides and curved outward as indicated. The disk is cut from 1/16-in. material and six blades are cut in it, the dotted lines showing where they are bent. A hole is drilled through the center so that it can be slipped on a shaft where it is held securely by means of two nuts and a lock washer. A fan of this kind can be run at high speed without any noise.



Adjustable Lumber Jack

Piling up lumber is facilitated considerably by the use of a simple jack of the kind shown in the illustration. It is made of hardwood and consists of a base and a



Adjustable Wooden Jack in Lumber Yard Aids Worker in Piling Up Lumber

standard to hold the lift pin. The latter is drilled at several points in a line to take a bolt which passes through the standard as indicated, and is provided with an iron point on the end to prevent the lumber from sliding. In use, the workman lifts a board at one end high enough to get its center on the jack, and he then pushes his end down so that the other end will be raised high and close enough for the man on the stack to take hold of it.—Bunyan Kennedy, McCool, Miss.

Remedy for Puddled Soils

Many soils have a tendency to run together after very heavy rain. This trouble is experienced mostly with silt and clay soils, and is caused by the soil particles being washed close together, making one solid, compact mass. Such a puddled condition forms a very hard crust when the surface dries, and it is only with great difficulty that young plants can force their way through. The circulation of air is also cut off and as a result both crop and soil suffer. The crust also causes increased loss of soil water due to evaporation, as there is a continuous movement of the water to the surface.

Puddling may be prevented to a great extent by increasing the amount of organic matter. This improves the structure of the soil, as it holds the soil particles together in small granules, which will not break up except during the hardest rains. The effect of organic matter on soils is witnessed by examining the soil on which a straw stack or manure heap was formerly located. Careful examination will show that such spots are mellow for a long time afterward, no matter how hard the surrounding soils may be. All soils should have enough organic material in them to prevent running together. Organic matter can be added by applying manures, and by growing suitable crops and plowing them under.—E. R. Haan, Chicago, Ill.

Improvised Countersink

An improvised countersink can readily be made from a hexagon-head machine screw. Each flat on the head is ground or filed down toward the center to the angle desired for the countersink, thus forming tapered cutting edges. It is, of course, advisable to harden the screw.

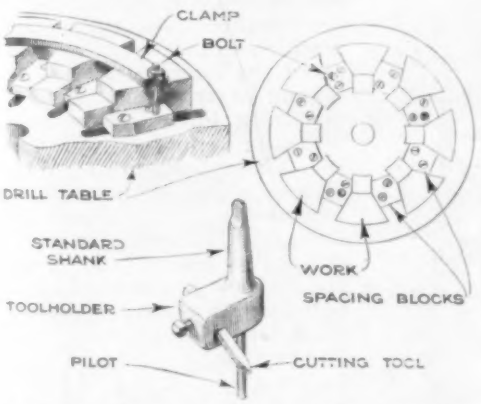
Holder for Acid Pan

For diluting sulphuric acid and taking care of any spilled acid when filling storage batteries, a most practical method is used by a service-station man. The work is done in an enameled pan which is suspended over the center of a large sink by a simple detachable wire holder. This is made of heavy galvanized wire, and may be made collapsible, for convenient hanging when not in use, by hinging the support that rests against the bottom of the sink to the upper part. To place the pan over the sink, without being in the way of the faucets or blocking the drain, is convenient both for working height and for harmless drainage of any spilled acid, the thorough dilution of the latter being accomplished by opening the faucets. The method is applicable also to use with acid baths for cleaning and pickling small parts.

Production Work on the Drill Press

In the manufacture of a large number of parts that required to be finished on three curved surfaces, ordinary methods were found to be too slow and costly. After giving the matter considerable thought it was decided to try and do the work on a drill press, the table of which was rigged up with a series of blocks between which the pieces would make the proper fit and be held down to the table by means of a circular clamp. The blocks were so spaced that the castings just dropped into place. This arrangement insured all of the work being located centrally. For the radius nearest the center an ordinary small boring bar was used and for cutting the second concave radius the tool shown was used. This had a pilot which centered itself in a hole in the center of the table. The outside radius was machined by a vertical cutter held in a toolholder of the same type.

This arrangement proved to be very efficient, completely machining eight pieces at a time. The job is one that would ordinarily be done on a lathe or miller, but in the absence of either, it suggests a method for doing other types of work that are generally done on such machines.



A Method for Turning Radii on a Drill Press, Adapting the Machine to Production Work

¶Copper is annealed by heating to a red heat and plunging into cold water.

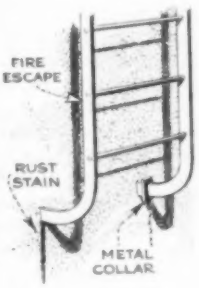
Lockers Used in Garages

In Brooklyn, N. Y., a locker system has been put in use in a garage so that customers can leave personal belongings safely while their automobiles are left for repairs or storage, without fear of loss or mix-up. The lockers consist of chests, kept in a storeroom at the rear of the garage. Each chest is locked and the key given to the owner of the contents. The cushions of the car are also removed and checked in the storeroom in order to eliminate the possibility of having them soiled while repairs are made. The locker service is free, which is a good advertisement.

Personal Belongings Put in Lockers in Garage Storeroom While Car Is Left for Repairs or Storage, in Order to Prevent Theft

Preventing Iron Stains on Buildings

Dark stains on brickwork below the supports of ornamental iron balconies or fire escapes are caused by rain washing away some of the paint on the ironwork and forming rust, which dissolves in the water and is deposited on the wall. On buildings constructed of light-colored brick or stone such stains are especially noticeable. To prevent them a tight-fitting metal collar should be fixed at the lower part of the support, as shown in the illustration. The collar should project about an inch beyond the support and be placed a few inches from the wall. The rain can then run down the support to the collar, but here it drips off away from the building.



MECHANICAL POWERS

By CARL W. MITMAN

Curator

DIVISIONS OF MINERAL AND MECHANICAL TECHNOLOGY
UNITED STATES NATIONAL MUSEUM

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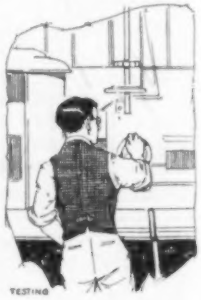
This is the sixth article of a series by Curator Mitman, explaining in simple language what every man who builds or designs a machine must know, and showing in detail just how to build a set of models of the mechanical powers that will exactly duplicate the set in the National Museum at Washington, D. C. The first articles appeared in the March, April, May, June and July issues, and the next will appear in the September number.

Part VI—The Inclined Plane and Wedge

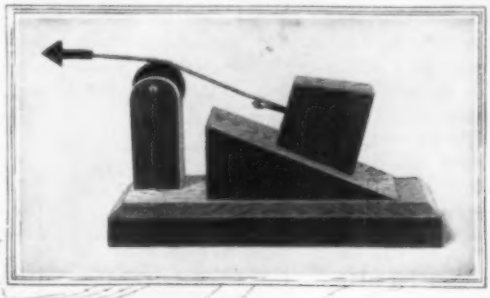
IN addition to the forces that have been discussed thus far and which are applied to a solid body from without, there are forces acting within a body as well. Such forces are known as stresses. The relation between these outer and inner forces is that those acting outside the body tend to deform it, but in so doing create stresses within the body which in themselves esist deformation. The primary stresses thus created are called tension, compression and torsion, or shearing. There are in addition so-called bending stresses, but these are simply combinations of tension and compression. In structures such as buildings, bridges, and the like, individual members of the structures are quite often subject to tension stresses only or compression stresses only, but in machinery and machine parts such simple stresses are rather rare, and instead the stresses are found to be combinations of two or more simple ones of tension and compression. This is especially true of those parts of a machine that are in motion. There is probably nothing more important than to be able to determine the stresses to which each part of a machine will be subjected, so as to give it sufficient strength to withstand the strain. Calculations can occasionally be made to solve this problem, but there are many instances where calculations cannot be made, or the results are uncertain, so that past successful designs and the results of practical experience ought to be given real consideration. In fact, in many instances one must rely wholly upon practical tests. The designer of machinery must take account of two main items; first, to develop a mechanism that will modify the various contending external forces so that the motions required can be obtained, and second, to proportion the various parts of the machine so that they can withstand the internal stresses set up and be strong enough to do the work intended for them. The first part of this problem is a direct application of the science of mechanics, but the second part involves not only this same knowledge but in addition that generally known as the strength of materials. The two are very closely connected, and the latter is largely used in such cases where it is practically impossible to calculate the size of a machine part because of the peculiar manner in which the forces are applied to it. Then, a definite



test is made to determine the actual strength of the material.

Of the forces acting upon a machine part only the load acting upon or transmitted through the part need ordinarily be taken into account, but there are occasions when the weight of the part must also be considered. In the case of flywheels or parts moving at high velocity, or subjected to changes in velocity, forces other than direct load are encountered that set up combinations of stresses which must be taken into consideration, and, lastly, there must be considered the character of the load. There are three different kinds of load: a steady or dead load; a live load, that is, one constantly in motion, and a live load alternating in direction, applied intermittently, applied gradually or applied suddenly. Of course, with manual power as the applied force (equal to about ⅛ hp.), the matter of strength of materials and internal stresses needs no more than passing attention, but with greater powers this consideration is highly important.

Broadly speaking, the inclined plane makes a man able to "lift himself up by his boot straps." Its use is as "old as the hills," the most pretentious application, according to a number of authorities, probably being in the construction of the pyramids of Egypt. The average weight of the stone blocks in these pyramids is around 10 tons, and to place them in position, there were available plenty of desert sand, millions of slaves, and unlimited time for the completion of the job. It does not require a great stretch of the imagination, therefore, to think that for each course of a pyramid an inclined roadway was first constructed to the proper height, and the blocks dragged or rolled by slaves up the incline and into position.

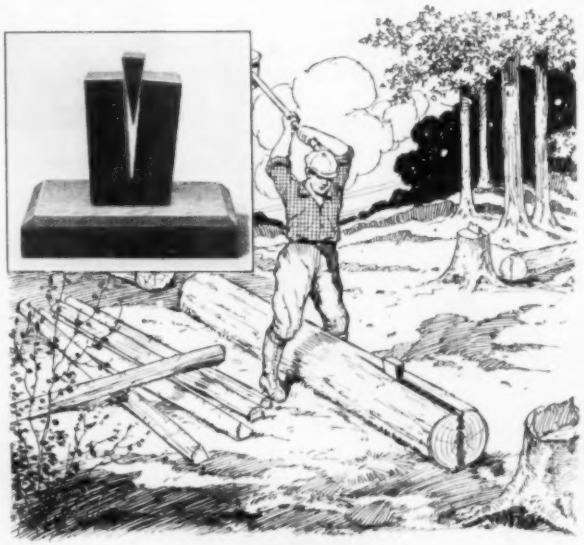


Model of Inclined Plane, with Illustration Showing How, It Is Supposed, the Ancient Egyptians Used the Plane in the Building of the Pyramids

With the coming of the automobile and the consequent erection of service stations and garages, the simple inclined plane has again found a practical application. At first such buildings were single-storied and covered large areas of ground; later the area was decreased and floors were added, with the installation of elevators; and lastly elevators have been eliminated and replaced by inclined planes, or ramps, between floors, thus making use of the auto-

mobile's own power to reach its storage space and saving the cost of elevator installation and operation. Man uses the inclined plane daily, for a stairway is nothing more than an inclined plane the slope of which is notched or stepped.

In mechanics the inclined plane is a hard, smooth surface set obliquely to the resistance. To move a load or weight, the applied force may act either in a direction parallel to the slope, parallel to the base or in any other direction, but in each case the conditions of equilibrium or the principle of work may be derived from those of the simple lever. For example, in the photo of the inclined-plane model, the direction of the applied force is parallel to the slope of the plane, and equilibrium will exist when the applied force is to the resisting force as the height of the plane is to the length of the incline or slope. While the resisting force is raised through a space equal to the vertical height of the plane, the applied force must move through a space equal to its length. In other words, if the slope is 10 ft. long and its height 2 ft., the applied force must move 10 ft. while the resisting force is raised 2 feet.



Model of Wedge; the Drawing Shows a Common Use of the Wedge, Which Consists of Two Inclined Planes, Base to Base

If, again, the direction of the applied force is parallel to the base of the plane, then equilibrium will exist when the applied force is to the resisting force as the height of the plane is to the base. From these two cases or conditions it follows that the effect of a given applied force is greater as the height of the inclined plane is diminished or its length increased; and that its effect is greatest when its direction is parallel to the slope, for if the applied force acts in any other direction, a part of it is expended either in increasing the pressure of the resisting force against the slope or in lifting it directly.

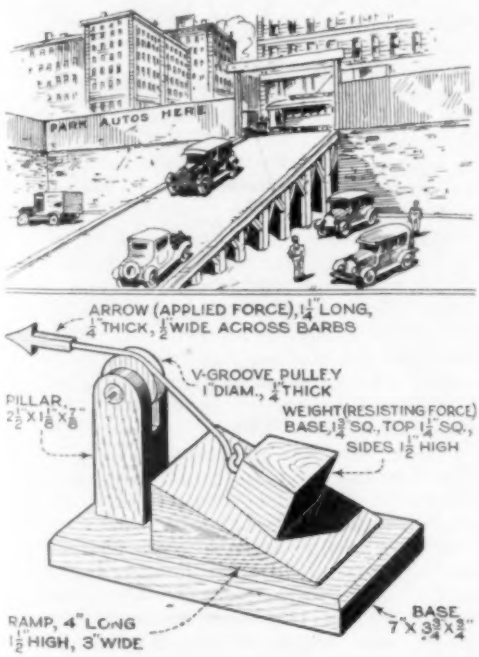
Instead of lifting a load by moving it along an inclined plane, the same result may be obtained by moving the plane under the load. When so used the inclined plane is called a wedge, which is extensively used in a variety of ways; it is often used, for example, as an aid to hold objects securely, such as a swinging door. A pair of wedges made to slide along their inclined faces forms one of the essential tools of the printer to hold a form of type in position. Since the days of Benjamin Franklin this little tool has been included in the printer's kit and is still indispensable to the trade. Again, some types of the so-called expansion bolt make use of the principle of the wedge, modified, however, away from the conventional form. Furthermore, by joining two inclined planes base to base, there results the familiar wedge used in splitting wood. In the wedge shown in the photograph, force is applied to the back of the wedge and is supposed to move through a space equal to the length of the wedge, while the resisting force (pressure) yields to the extent of the breadth of the wedge.

As a mechanical power the wedge is used only where great force is to be exerted in a limited space. The edges of all cutting tools, as saws, knives, chisels, razors, scissors, etc., and the points of piercing instruments, as awls, nails, pins, needles, etc., are all modified wedges. In general, the softer or more yielding the material to be worked, the more acute the wedgelike tool may be made. For example, chisels intended to cut wood have the edge at an angle of about 30°; for cutting brass from 50 to 60°, and for steel from 60 to 70°. Furthermore, tools that cut by constantly applied pressure may be sharper than those which cut by impact or blows. The theory of the wedge, however, takes no account of friction, which largely modifies the results, so that the relative effect of constant pressure and a blow cannot be defined.

For the model of the inclined plane, the following materials are required:

Base, 7 by 3¾ by ¾ in.
Pillar, 2½ by 1⅝ by ⅞ in.
Pulley, 1-in. diameter, ¼ in. thick, V-groove.
Ramp, 4-in. base, 1½-in height, 3-in. width.
Weight (resisting force), base 1¾ in. square, top 1¼ in. square, side 1½ in. high.
Arrow (applied force), 1¼ in. long, ¼ in. thick, ½ in. wide across barbs; shaft, ¼ in. square.

Square and face the base with a finish bevel on top. On the center line of the base and ¾ in. from the end, secure the ramp with glue and by screws from beneath. Saw and chisel a groove in the center of the pillar top, ⅞ in. deep and ⅜ in. wide, and round the ends of the lobes or ears thus fashioned. Drill a ⅛-in. hole through the center of the pulley and the ends of the lobes and mount the pulley in the groove on a suitable axle. Attach this assembly to the base on the center line, ⅜ in. from the end, with glue and screws from beneath. Attach the end of a length of lead wire (representing a rope or cord) to the screweye used as a handle for the weight, and to the other end of the wire affix the arrow by inserting the wire in a hole drilled lengthwise in the shaft. Rest the weight on the ramp and the wire in the pulley groove. Finish as desired. The wire may be enameled white to represent a cord more closely.


PARK AUTOS HERE
ARROW (APPLIED FORCE), 1¼" LONG, ¼" THICK, ½" WIDE ACROSS BARBS
V-GROOVE PULLEY 1" DIAM., ¼" THICK
PILLAR, 2½" X 1⅝" X ⅞"
WEIGHT (RESISTING FORCE) BASE, 1¾" SQ., TOP 1¼" SQ., SIDES 1½" HIGH
RAMP, 4" LONG 1½" HIGH, 3" WIDE
BASE 7" X 3¾" X ¾"

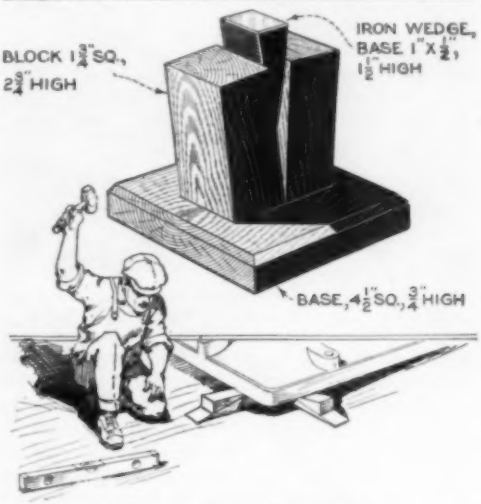
Details of Model of Inclined Plane; Above, a Modern Use of the Ramp

For the wedge model, use the following material:

Base, 4½ in. square, ¾ in. high.
Block, 1¾ in. square, 2¾ in. high.
Iron wedge, base 1 by ½ in., side 1½ in. high.

Square and face the base with a finish bevel on top. Saw a cut lengthwise nearly through the block. Insert the wedge into this cut and force it in for about two-thirds of its length, separating the halves of the block, but taking care not to split it; if necessary, saw the cut in a triangular shape before forcing in the wedge. Square the bottom of the block and secure to the base with glue and screws from beneath. Finish as desired.

(Continued Next Month)



Wedge-Model Dimensions and Illustration Showing Use of Wedge in Leveling Machinery

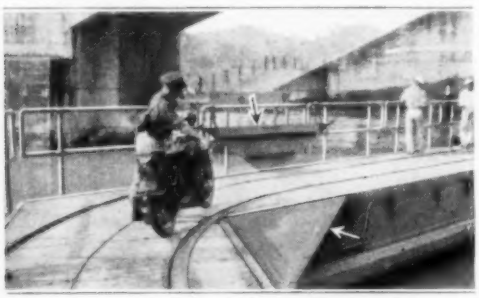
Lubricant for Auto Springs

Oil and graphite applied to the leaves of automobile springs is usually effective for a short time only, but the following mixture has been found to last for an entire season, as the wax contained in it holds the graphite between the leaves and also keeps the grease from forming an emulsion with water: japan wax, 10 parts; flake graphite, 10 parts; cup grease, 5 parts; kerosene, 1 part.

The wax can usually be had at any laundry, but if it cannot be obtained, ordinary paraffin or beeswax will do. The graphite is first mixed with the grease and the wax cut in small pieces and added, the whole being then carefully melted and thoroughly mixed. Remove the mixture from the fire before adding kerosene.

Guard Gates Used as Bridges

Guard gates are used at the Panama canal to accommodate vehicular traffic. When these were first so used it was found that, while the width permitted the passage of an automobile, the gates at their meeting point formed too sharp an angle for an auto to turn safely. To overcome this difficulty, removable triangular plates were made to fit into the corner as seen in the photo. When the gates are to be opened, this plate, of course, has to be removed and is then hung on the railing of one of the gate leaves, as indicated by the black arrow.



Steel Plate Used at Angle of Guard Gates at Panama Canal to Permit Vehicles to Turn Corner Safely

Valuable Water-Cooling Kink

Customarily the method of cooling water by an ammonia coil is to have the latter located in the water tank as shown in Fig. 1. The objection to this method is that the water may freeze solidly if not kept in continual motion, the result being a burst tank.

Figure 2 shows a method which entirely eliminates this danger. The ammonia coil is placed in a large open tank as indicated, close to the top, and the water runs through a coil located near the bottom. The tank is filled with water. This water may freeze near the top but will not freeze solidly, and consequently there will be no rupture. As the ammonia coil is located near the top, it cools the surface water and this water then moves toward the bottom. The cold water, which is never below 32° F., surrounds the lower coil and cools the water in it. As water is drawn off intermittently from this coil, new water enters it and the water in the lower part of the tank becomes somewhat warmer than the top layer, causing it to rise again, and thus circulation in the tank is maintained.

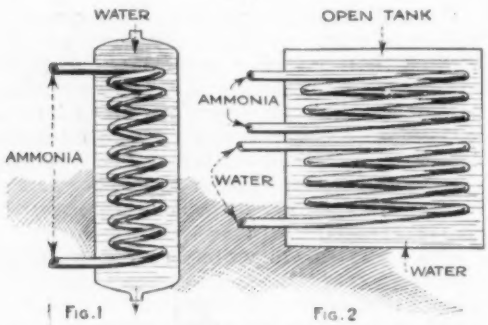
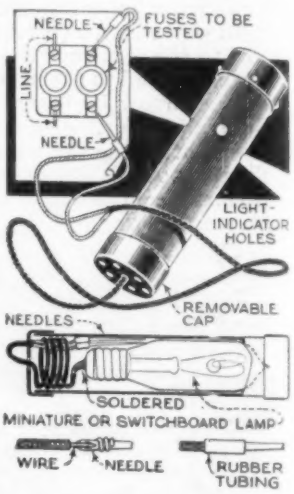


Fig. 1, Customary Method of Coil in Tank; Fig. 2, Better Method Which Prevents Freezing

Compact Fuse Tester

After using a weatherproof socket with an ordinary 25-watt lamp as a fuse tester, and breaking some lamps as a result, I began to consider the possibility of using a smaller lamp and so protecting it that breakage would be unlikely. The result was the compact tester detailed herewith. I obtained a telephone-switchboard lamp and inclosed it in an empty cartridge fuse of large size, as shown. Holes were drilled in the sides so that the lighting of the lamp could readily be observed. The brass cap at one end, which in this case happened to be perforated, was made removable by pulling out the small brass rivets which held it in place. A length of common lampcord was soldered to the two base terminals of the lamp and to two darning needles, as shown. The lamp was then pushed into the cartridge and the lampcord threaded through one of the holes in the cap. When not in use, the cord and needles are disposed of inside the cartridge as indicated, permitting the tester to be carried in the pocket. The joints of the wire and the needles were covered with short pieces of small-bore rubber tubing, to provide convenient finger grips, and avoid danger from shocks.—W. W. Parker, Lead, S. Dak.

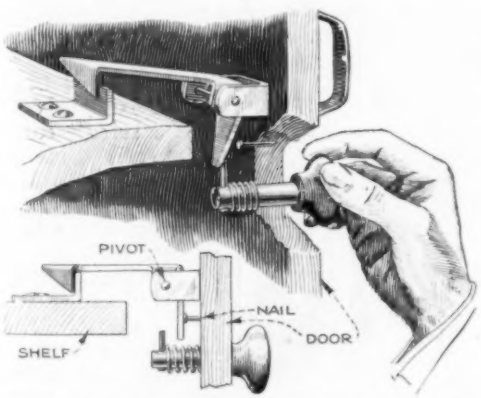


Keyless Lock for the Tool Cabinet

There are many kinds of combination locks, but few are as simple and effective as the one shown in the illustration. Since I put this on my tool cabinet a number of people have tried to open it without success, some not being able to do so even after the secret was explained to them.

There are no numbers, marks or even turns to count; simply a knob that can be manipulated as readily in the dark as in the light, because operation of the lock depends on the sense of touch. The latch is made of heavy sheet metal, and the drawing shows its construction clearly, so that no detailed description is necessary. The knob has a shank that passes through a hole drilled in the drawer front; this shank may be of any convenient size—an old valve stem, drilled at one end to take a stout wire pin, will serve very well. A coil spring is fitted between the pin and the inside of the cabinet front, to keep the shank pressed back. The shank should be long enough to allow the pin to pass the downward-projecting part of the latch, either in front or behind, without touching. A small nail is driven into the cabinet at the point indicated so that the end of the latch will rest against it.

To operate the lock, the knob is pulled outward and turned until the pin is found, by sense of touch, to rest behind and against the latch; then it is pushed in, thus raising the latch.—E. Leslie MacFarlane, Nashwaaksis, N. B., Can.



Simple and Fool-Proof Keyless Lock for the Tool Cabinet, Which Cannot Be Opened by Those Not in Secret

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¶A draftsman's pen should not be thrown away when it is worn down and can no longer be used for ruling. It should be put in the shop's first-aid cabinet, as no better tweezers can be obtained.

Refuse Hopper for Fruit Screen

In a section of the country where cranberries are grown extensively, a boat-shaped device with a slatted bottom is used to screen the berries. Much of the chaff, twigs and dirt falls between the slats, but unsound berries still remain to be separated from the sound ones. It is customary to have a measure standing on the screen into which the refuse is thrown by the pickers. The repeated emptying of the measure causes much loss of time, and therefore one grower built a chute or hopper on the bottom of the screen leading into a barrel, as indicated. Cleats were nailed across the slats at a convenient point underneath; an opening, about 6 in. square, was cut out and the hopper was built up around this opening about 10 in. high. This proved quite a convenience and timesaver, and would no doubt be useful also for screening other small fruits, such as cherries, blueberries, and the like.—L. B. Robbins, Harwich, Mass.

Hopper Built over Hole in Screen Bed Conveys Unsound Berries into Large Barrel

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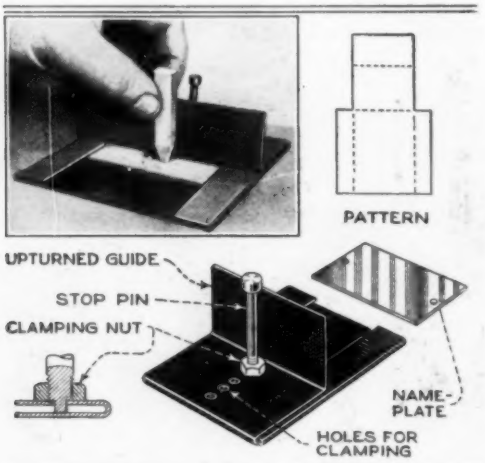
Using Magazine Clips

The large clips used by dealers to display current issues of magazines are equally useful for the same purpose in the home in case the table room is limited. The magazines may be hung from nails driven into the wall, especially in the den or workroom, so that they are readily available. In this way, magazines can also be held open in shops where the pages might be soiled by handling.

Stamping Nameplates

In the manufacture of a number of brass plates on which the lettering had to be stamped neatly and accurately it was a problem just how to stamp the letters so



Sheet-Metal Fixture for Holding Brass Nameplates While Lettering Them

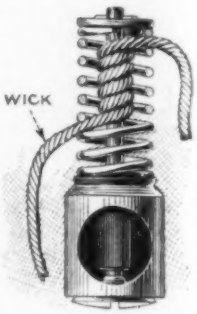
that they would be in a straight line. As only the regular steel stamps were available, it was thought best to use some kind of fixture to guide the stamps and hold them squarely in position. The fixture illustrated was the result.

It is made from a piece of sheet iron folded over on two sides as shown, one end being doubled over these folds and then bent up at right angles to form a guide against which the letters are held. A number of holes are drilled in line in the center back of the guide for a stop pin, which consists of a bolt and nut. The pin should be a snug fit in the holes, the screw thread below the nut being ground off to fit the hole and the nut resting on top. The distance between the folded sides of the holder is a sliding fit for the particular plates to be stamped and the plates are pushed against the stop pin. Thus, with the stop pin in the first hole and each stamp held close against the guide the first line is stamped. The holes should be so arranged that the lettering will be properly spaced.

Keeping Paste from Souring

There is no necessity of using sour paste for wall-paper hanging as is often done, for a few drops of formaldehyde will keep it sweet indefinitely. After experimenting with various substances, I found that formaldehyde was the most effective. A few drops were added to a cupful of paste, after this had been boiled, and this sample was found still sweet when examined a year later.—A. A. Kelly, Paoli, Pa.

Oiling Valve Stems



Lubricating valve stems on cars having overhead valves can be accomplished effectively by the method shown in the illustration. An asbestos rope, about 5/16 in. in diameter and about 8 in. long, is wrapped a few turns around the stem after the spring has been removed. The ends are folded down along the stem and brought out at the bottom so that the pressure of the coil keeps them from working out of place when the spring is released. The application of a few drops of oil on the wick every week keeps the stem lubricated and prevents dirt from getting in contact with it.

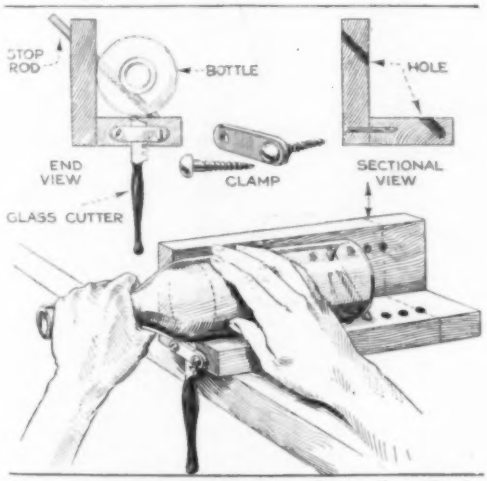
Window Frames for Small Buildings

Framing windows on small buildings, especially those that have only a few studs, is usually quite a problem. A frame put on the outside, however, as shown in the drawing, presents a good appearance and has been found very satisfactory. It is made of lengths of 2 by 4-in. stock set on edge with the sashes hinged on as indicated. The frame is made long enough for as many sashes as are to be mounted and the latter are separated by 2 by 4-in. pieces. The frame is nailed to the building from the inside. A 1 by 12-in. piece of boxing, nailed at each end, will keep the frame in place until the top and bottom pieces are nailed on. A length of quarter round is nailed along the upper edge of the frame to turn water.

Novel Circular-Glass Cutter

Two 12-in. lengths of 4-in. wood, a short brass rod and an inexpensive glass cutter form a novel tool for cutting glass of cylindrical shape. It has been found very satisfactory by an eastern concern that specializes in manufacturing wicker flower holders, the wicker work inclosing a glass container for the water. These containers are made from round bottles of various sizes and colors, the tops being cut off with the tool shown in the accompanying illustration.

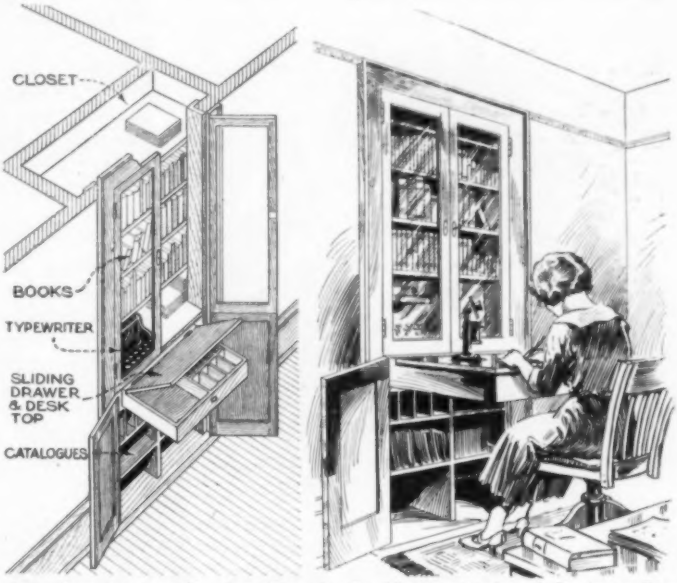
The two lengths of wood are nailed together edgewise at right angles, several holes being drilled in both pieces to receive a brass rod, which serves as a stop during the cutting operation. The cutter is attached to the end of the lower piece by means of a short brass strip and two wood screws. The method of using the device is obvious; the bottle is simply turned by hand until a scratch is made around it, whereupon the top part can easily be knocked off. The sharp edge of the glass is smoothed on an emery wheel to prevent danger of cutting the hands.—G. A. Luers, Washington, D. C.



Simple Homemade Circular-Glass Cutter Cuts Bottles Quickly and Accurately

Desk and Bookcase Built in Closet

It is often desirable to have a large desk at home for correspondence work, bookkeeping, etc., but on the other hand it may be objectionable on account of the space it occupies, and because the children will put their toys and other articles on it and can not restrain their curiosity as to the contents of the drawers. With this in mind a Washington contractor built a compact desk of large dimensions, the top of which, when not in use, could be pushed entirely out of the way into a locked closet. The closet was fitted with glass doors above and paneled doors below so that it did not detract from the appearance of the room in any way. The general plan of construction is given in the drawing, and can, with slight modifications, be adapted to most cases.

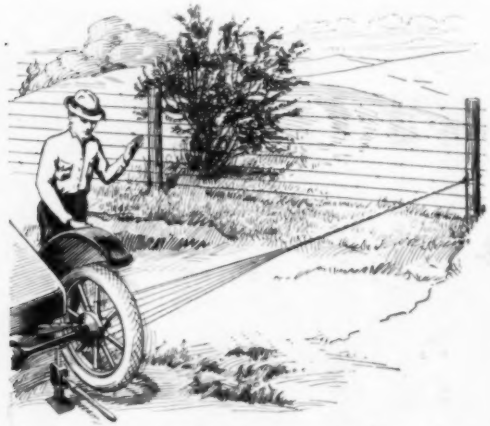


Left, Part Section, Showing How the Combination Desk and Bookcase Fits into the Closet; Right, Desk in Use

The closet consists of two compartments, separated by a horizontal shelf about 1 in. above the top of the desk, which should be about 30 in. high. Under the desk top, which is hinged, is a full-width drawer for the support of which slides are provided, and the space below is divided into shelves and pigeonholes for catalogs, stationery and the like. The drawer may also be partitioned to suit the user's particular needs. Shelves are provided in the upper compartment for books and magazines, and for the typewriter and telephone, if desired.

Making Stranded-Wire Cables

Having had considerable difficulty in obtaining good seven-stranded cable for guy wires, I hit upon the following method of making it myself: I jacked up one of the

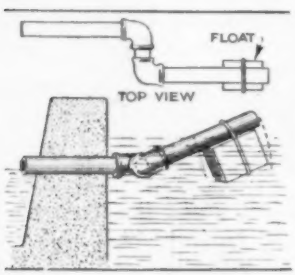


Simple Method of Making Neat Stranded Cable from a Number of Galvanized-Iron Wires

rear wheels of my car and fastened one end of a coil of galvanized-iron wire to one of the spokes, brought the wire around a fencepost, directly in line with the wheel, and attached it to the opposite spoke of the wheel, cutting it from the coil at this point. Two other lengths of wire were run in the same way and also a single length from the wheel to the post. I then started the engine and put it in gear, which caused the rear wheel to revolve and twist the wires as desired, making a strong cable. With this method I have made cables 150 ft. long.—L. Cook, Bloomingdale, Mich.

Nonreversible Drain

Water in a reservoir is usually kept below a certain level by providing a drain pipe that carries off the surplus water. Where the drain extends horizontally through the wall and discharges the water into an exterior ditch, it often happens that the water level in the ditch becomes higher than that in the reservoir, due to heavy rainstorms, and water then flows back into the reservoir through the drain. This trouble can be prevented by installing a drain of the type shown in the illustration. It consists of two short lengths of pipe, two elbows and a nipple, arranged as shown in the upper detail. The couplings must be loose enough to permit the length of pipe extending into the ditch to move up and down freely. An airtight can is wired to the end of this pipe to keep it above water when the exterior level is higher than that in the reservoir, so that the water from the ditch will not flow back.—Harold E. Benson, Boulder, Colo.

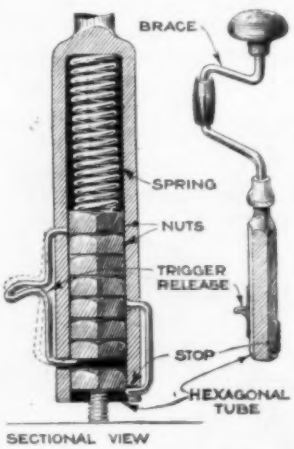


Drilling Glass and Pottery

Drilling holes in glass and pottery is usually done with a highly tempered drill using camphor oil as a lubricant. Another good method—in many cases better—is to grind the holes by means of carborundum stones of proper sizes, set in the drill chuck and revolved at high speed. Holes have been ground through pieces of hard pottery in this way where the drilling method failed.

A Magazine Nut Wrench

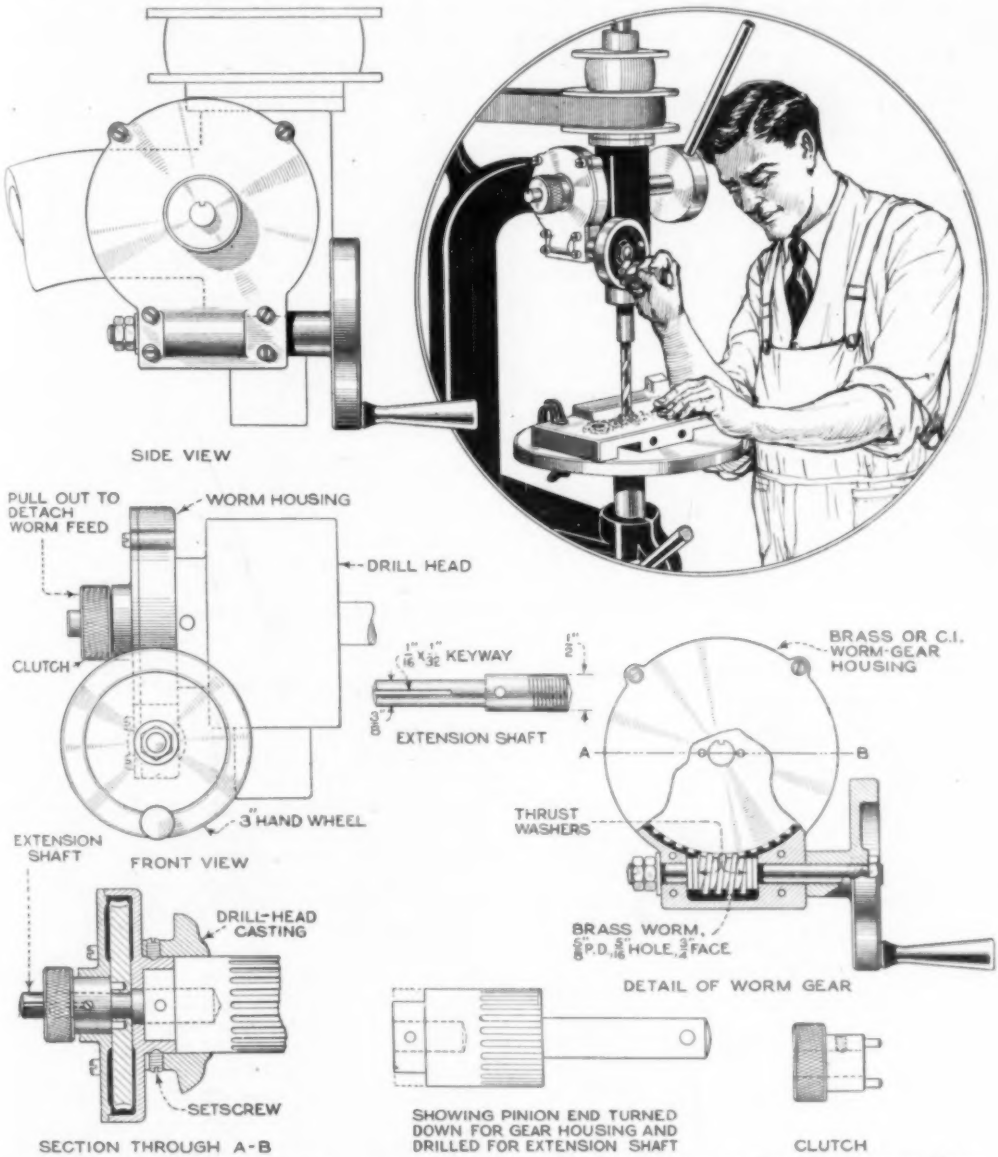
Automobile assemblers and others who, from the character of their work, must screw down large numbers of nuts of the same size, will find in the tool illustrated a means of largely reducing the number of movements required. As shown in the drawing, the magazine consists of a hexagonal tube, that can easiest be made by forming a piece of steel tubing over a mandrel of the same size as the nuts to be used, and welding into the upper end a suitable square shank. A compression spring inside feeds the nuts forward as fast as they are released by the trigger, which is operated manually, the nut being prevented from falling out by the stop on the opposite side. Both these parts are made from spring-steel wire with their lower points spaced apart just the thickness of one nut.



Worm-Gear Attachment for Sensitive Drill Press

By H. H. PARKER

THE type of small sensitive bench drill shown in the illustration is extensively used for light work in machine shops, factories and garages, as well as similar machines with bevel-gear drive, of slightly greater capacity. The feed is obtained by means of a rack and pinion actuated by a hand lever, and is perfectly satisfactory for small or intermittent work, but for drilling ⅜ to ½-in. holes in hard steel, with the machine working for long periods of time, the pressure required on the hand lever is rather tiring upon the operator, and a worm gear with handwheel feed, as applied to a large drill press, would be of decided advantage. The drawings show how such a feed arrangement can be applied to the bench drill without any considerable alteration of the machine, and without detracting from its appearance or preventing use of the hand lever; the patterns required are simple and most of the



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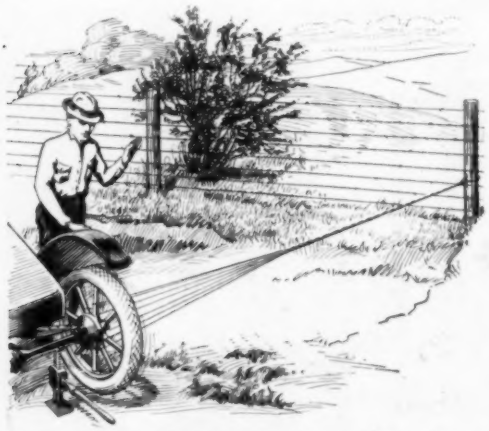

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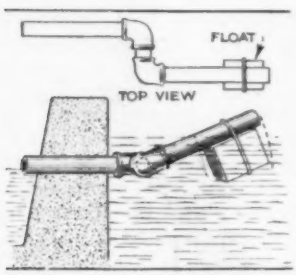

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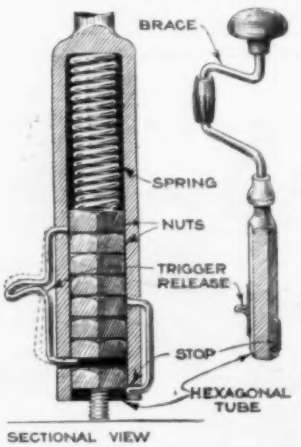

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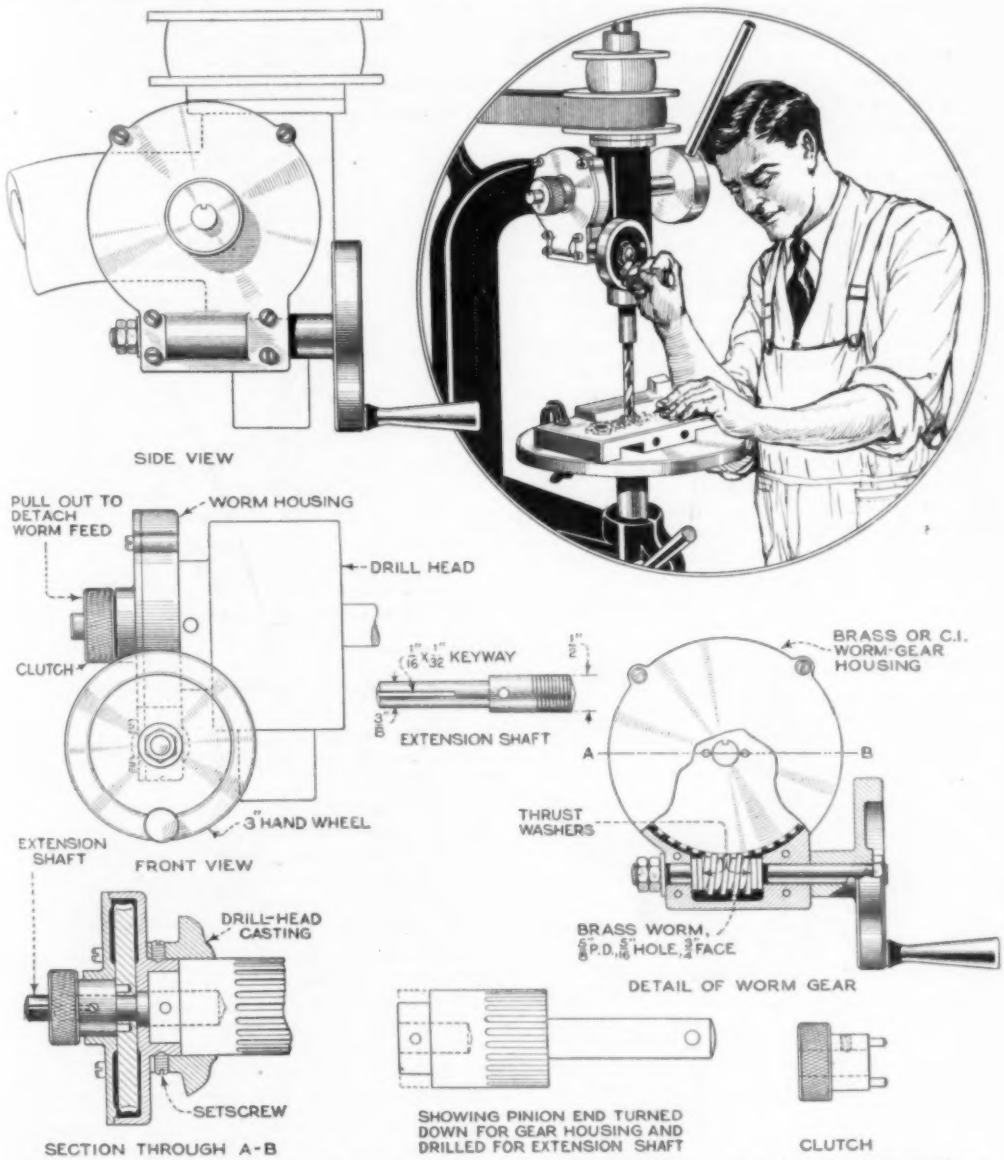
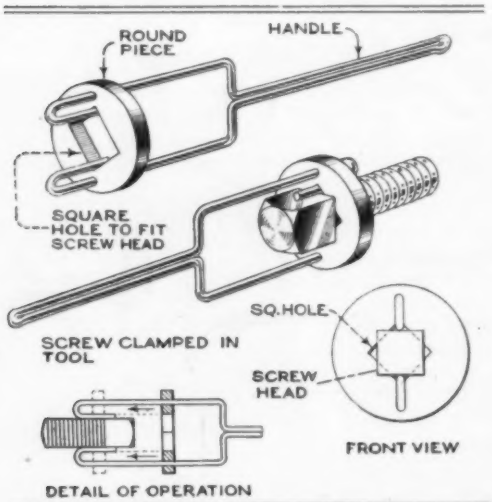


Fitting a Handwheel Feed to a Sensitive Bench Drill Press; an Attachment of This Kind Permits Heavy Work to Be Done over a Long Period without Fatigue

machine work can be performed in the lathe. While the drawings are approximately to scale, the exact dimensions will depend upon the type of drill press and the size of the worm wheel and worm. The latter may be obtained, finished, from any manufacturer of cut gearing; they are usually of brass in the small sizes. A diametral pitch of 16 is about right with a worm wheel of 3 to 4-in. diameter. Most of the bench drill presses are built with a feed pinion turned from solid stock, with a shaft at one end to take the feed-lever boss. The other end is left the full size of the gear blank and rotates in a bearing bored out of the drill-head casting. By turning this end down for about ½ in., reducing the diameter by ⅜ or ½ in., an annular space will be formed in the pinion-bearing housing, with the pinion shaft in place, into which the boss of the worm-wheel housing can be pushed and locked in place by means of setscrews. The pinion shaft will now rotate in the worm-wheel housing as a bearing, while a stub, or extension, shaft must be screwed into the pinion shaft to take the worm wheel.

A cast-iron or brass casting is made for the worm-wheel housing; either in one piece with a cover as in the drawing, the worm shaft being put through a drilled hole, or made in halves like a blower case. In the drawing a worm wheel without a hub is shown; as this is loose on the shaft, the cover is made with a boss that bears against the web of the wheel, to steady it, a similar shallow boss being provided on the inside of the housing casting. The cover is held by three or more setscrews. A ½-in. extension shaft is driven, or screwed, part way into the solid end of the pinion shaft, pinned in place and then turned down to take the worm gear, which is not fastened to it. Means must, of course, be provided for clutching and declutching the worm wheel when the worm feed is to be used instead of the hand lever, and vice versa. The clutch is made from a steel bar, which slides on the shaft extension and engages the worm wheel by means of two ⅛-in. steel pins that fit into holes drilled in the web of the wheel. A keyway is cut on the outer end of the shaft, and a setscrew, with its end filed to fit the keyway, set into the sliding clutch to make it rotate with the shaft. The filed end must, of course, be a sliding fit in the keyway. When the hand lever is to be used, the knurled end of the clutch is pulled out, which will disengage the worm wheel from the shaft.

Fitting the worm shaft is the only operation requiring special care; the hole for this must be accurately drilled and reamed in relation to the worm-wheel shaft. The worm (unless solid with the shaft, in which case a divided housing, or a large-diameter entrance hole is needed) is pinned, or preferably sweated, to its shaft, and thrust washers, or small ball thrusts, fitted at each end. The handwheel is 3 to 4 in. in diameter, pinned or keyed and held with an end nut; a pair of locknuts are screwed to the other end of the shaft. The arrangement of the housing and type of the clutch may, of course, be changed to suit the individual ideas of the builder, but the type shown is easy to make.



Nonslipping Holder for Square-Head Screws

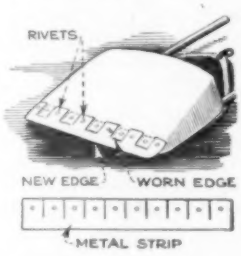
Gripping Square-Head Screws

Pliers, tongs and other similar tools are often used for dipping small fixtures in cleaning solutions, but it often happens that the only part of the fixture that can be gripped conveniently is a projecting square-head screw, and holding this with the tongs or pliers often results in dropping the fixture to the bottom of the tank. An excellent holder for this purpose is shown in the illustration. A round-steel washer is squared out in the center to fit the screw head, and two holes are drilled through it on opposite sides, and in line with the corners of the square. A piece of drill rod is then bent, as shown, to fit these two holes, and with the ends bent backward to fit closely in the corners of the square. The tool is made to grip the screw by first pushing the handle forward until the ends clear the square hole so that

the latter can be passed over the screw head. When clear over, the tool is given an eighth of a turn and the handle pulled backward to lock the ends against the screw head. A little study of the drawing will soon show that the tool is nonslipping and that it is impossible for it to come off while the fixture is being swirled around in the tank. To remove the tool the operations are, of course, reversed.

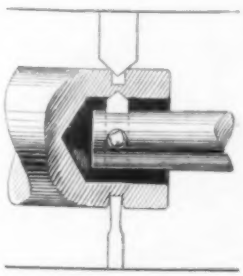
Prolonging Life of Scraper

After a season of use, the edge of a scraper is usually worn out. It can readily be repaired, however, so that it will be nearly as good as new by riveting a 6-in. strip of steel to the edge, as shown in the illustration. The strip should be as long as the scraper is wide and is slitted so that the resulting "tongues" can be fitted alternately to the top and bottom of the scraper. The strip is then riveted to the scraper, as indicated, and the rivets countersunk on the underside. This will make a strong edge that will not bend easily.—Stanley McCosh, Novi, Mich.



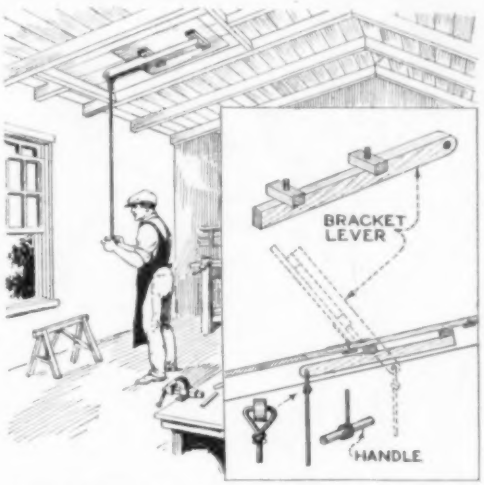
Making Collars in One Operation

The arrangement of tools shown in the illustration has been found very handy in making collars and washers on screw machines directly from tubing without a second operation for burring or countersinking, as is usually necessary. The collars are cut off with the parting tool, which is mounted on the front cross slide, and the outer edge is chamfered with a chamfering tool on the rear cross slide. The inside edges are chamfered with a tool held on a bar carried in the turret. The latter tool is fed in to the proper depth as controlled by the turret stop, and then into the work to such a depth that after the parting tool has gone through, a chamfer will be left on the inside edge.



Control for Roof Trapdoor

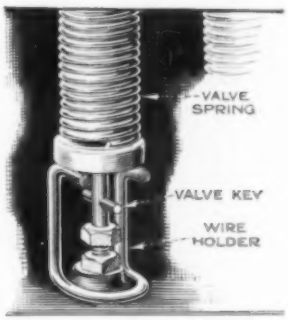
Trapdoors are usually rather difficult to open and for this reason the simple and easily operated control shown in the drawing should meet with instant favor. It eliminates the necessity of climbing up on a ladder. A bracket lever is bolted to the underside of the door so that it extends beyond the hinged edge, as shown, and a ¼-in. iron rod is attached to the end of the lever. A quick pull on the rod causes the trapdoor to swing to the position indicated by the dotted lines in the detail, a stop being provided to hold it there.



Bracket Lever and Iron Rod Used to Control Roof Trapdoor from Below

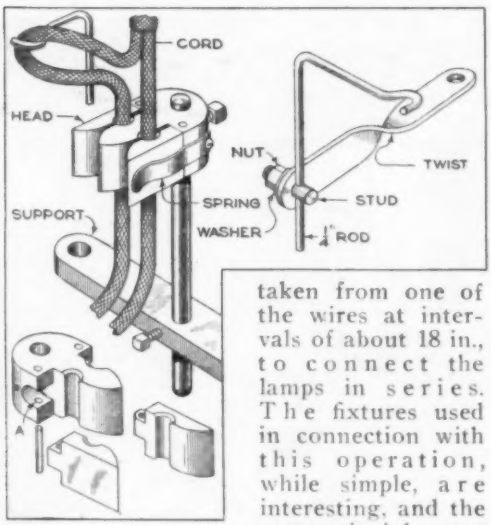
Wire Bracket Holds Valve Springs

Holding up valve springs is one of the difficulties met with when regrinding valves and removing carbon. Various kinds of holders are on the market, but one that is of simple construction and performs the work as well as the best, is shown here. It consists of a length of heavy wire, at least 3/16 in. in diameter, bent to the shape indicated. After the valve spring has been raised, the holder is placed under it and will then hold the spring securely, without slipping.



Guide for Special Work in Braiding Machine

In making lamp cords for Christmas trees, two single wires are run together through a braiding machine, taps being



taken from one of the wires at intervals of about 18 in., to connect the lamps in series. The fixtures used in connection with this operation, while simple, are interesting, and the same principles may be adapted to much other work.

The drawing shows the attachment that replaces the regular guide. It is made of machine steel, casehardened. The center part of the head is milled out as shown in the lower detail, the slots at A being machined with an end mill. The two swinging pieces have lugs that fit into slots A, and are fastened to the center part by steel pins. Flat springs bearing against the sidepieces keep a tension on the wire as it is drawn through the guide. The holes for the wire are drilled and countersunk, half in the center and half in the sidepieces, and the head is held by a ⅜-in. rod, passing through a flat-steel bracket bolted to the base of the machine. To insure all the taps being of equal length the fixture shown at the right was made. This consists simply of a ¼-in. rod, bent as shown and passing through a hole in a stud that binds the rod against a cold-rolled steel bracket. Adjustment of the distance between the rod and guide is effected by swinging the rod.

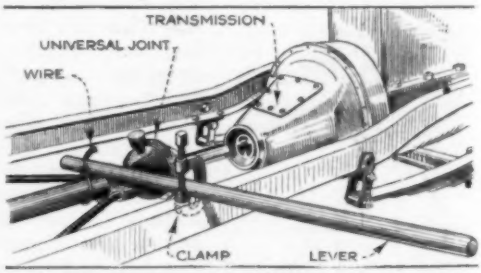
One insulated wire of each pair is drawn out to the hook, pulled tight, and the machine started, braiding on past the tap. As the braided cord travels up over the tension drum, another ¼-in. rod, fastened to the machine frame, and bent to touch the drum, shows the operator where to stop the machine and form the next loop.

Centering Short Shafts

In the production of a large number of short shafts the work of centering them was quickly and conveniently accomplished with the use of the fixture shown in the illustration. It consists of a cast-iron base, drilled to receive a vertical rod and having a setscrew to hold the latter in position. A similar piece, or head, of cast iron, drilled to a sliding fit on the rod, is also provided. It is held in alinement directly over the base by a key seated in the head and running in a keyway in the side of the rod. Both base and head are countersunk to receive the shafts and a punch is provided in the head, in the center of the countersink, as shown. In use, the shaft is placed in the lower countersink and the head lowered so that the shaft is held as shown. The punch is then tapped, with the hammer, and the process repeated for the other end of the shaft.—J. H. Rodgers, Toronto, Can.

Connecting the Universal Joint

The removal of the rear-axle assembly on the Ford car necessitates the disconnecting of the universal joint, and it is quite a difficult job to reconnect the joint by hand. However, with a lever fastened



Lever Aids in Connecting Universal Joint to Engine When Rear End Is Replaced

to the joint by wire or rope and pivoted on the frame by means of a C-clamp as shown, the operation becomes quite easy. The arrangement gives a combined lift and

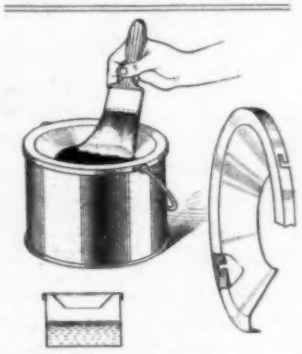
thrust. The universal joint is packed with heavy cup grease, which will steady the end. An open-end wrench is used to bring the shaft end in alinement with the socket.

Oiling Typewriter Bars

When overhauling typewriters the bars must be oiled a little before they are replaced. This is usually done by squirting a few drops of oil on the bars or by rubbing them with an oil-soaked rag, but these methods are slow, and therefore a repairman devised the oiling pad shown in the drawing. The pad consists of a piece of thick felt, fitting inside the tin cover of a typewriter-ribbon box, the edges of which are bent over and flattened down to hold the felt in place. Enough oil is applied to the felt so that a slight pressure will bring it to the surface. Each side of a bar is pressed against the felt with the result that it is moistened with just sufficient oil.

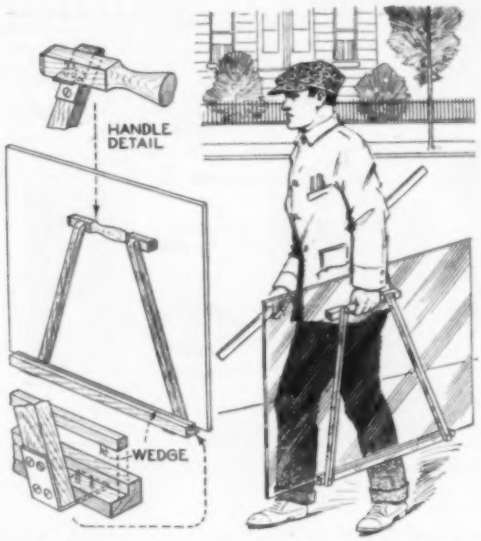
Neat Safety Paint Pot

The paint pot shown in the drawing is designed for inside work, to prevent spilling of the paint if accidentally tipped over, and also to provide a guard against which the brush can be wiped, in order to keep the outside of the pot clean. For these reasons the pot should be shallow and of fairly large diameter, and the guard as wide as possible, while permitting the brush to enter freely through the center opening. The safety cover or guard is made of tin and shaped as shown in the detail. It is held on the pot by means of two bayonet slots in the turned-down edge which engage the ends of the bail. Only as much paint should be put into the pot as will be confined in the space under the cover if the pot is accidentally tipped over.



Handy Glass Carrier

Large panes of glass, which are ordinarily difficult to carry due to their bulkiness, can be carried conveniently by means of the holder shown in the illustration. It is made in any desired size from lengths of 1 by 2-in. wood. The lower rail on which the glass rests is screwed to two strips which are attached to the handle. A taper groove is cut lengthwise in the lower rail to receive the glass and a felt-covered wedge is provided to fit in this groove, against the glass, to hold it in place.—J. R. Minter, Chester, Pa.



Convenient Holder for Carrying Large Panes of Glass

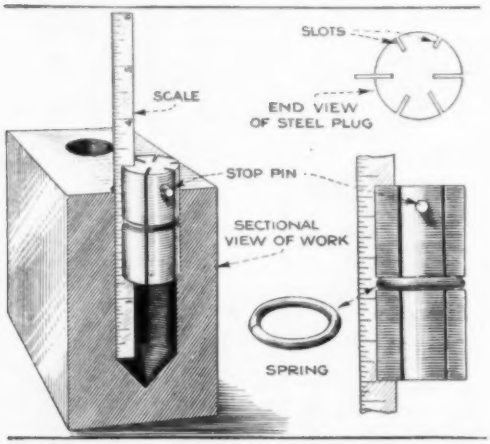
Novel Arrangement of Cash Register

Cash registers in most stores are set to face the space inside of the counter, which is often inconvenient as it necessitates passing around the counter to "ring up a sale." However, by mounting the cash register on a small turntable on the counter, clerks on either side can use it by turning it around.

Brass is annealed by heating to a cherry red and then allowing it to cool slowly.

Depth Gauge for Drilled Holes

Measuring the depth of drilled holes is a somewhat uncertain operation, as the bottom is conical and dimensions are invariably given to the top of the cone. Most measuring devices used for this work tend to slip down into the conical end, and therefore one cannot be sure whether the holes have been correctly gauged or not. On the production of a machine part furnished with several holes of slightly different diameters, one shop uses the gauge shown in the photo.



Accurate Plug Depth Gauge for Measuring Drilled Holes

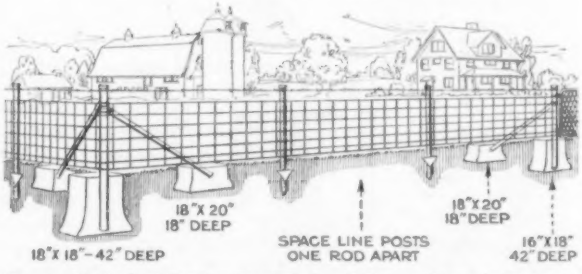
It consists of a round-steel plug with slots sawed in it lengthwise, the depth of these slots varying to suit the different hole diameters so that when the scale is inserted in the slot the plug and scale will fit the hole exactly, as shown. A groove is cut around the plug in the center and a single coil of spring wire slipped in it to hold the scale lightly in any of the slots. At a definite distance from the top a pin is driven through the plug to prevent it from falling into the hole. In use, the scale is slipped in the slot marked to suit the hole to be measured and the plug inserted into the hole until the pin rests on the top. The scale is then pushed down until it strikes the bottom and the reading of the scale taken from the top of the plug. Thus if the face of the pin is ½ in. below the top of the plug, the correct measurement will be ½ in. less than the depth to the top of the plug. With slots sawed in the plug to suit the different holes it fits snugly in each case, and the measurements are accurate.

Steel Fence Posts

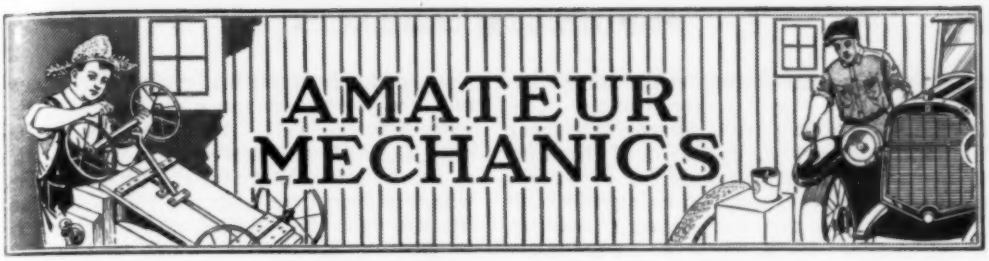
Good fences add to the appearance and value of a farm, and save the farmer many losses of live stock and crops. In recent years steel-post fences have gained popularity because they are rot-proof, lightning-proof, weather-resisting and durable in every way. Although they cost a little more than wooden ones their use is economical because they will outlast the latter many times. There are, in fact, records of steel posts set up 35 years ago that are still in good condition, while the average wood post lasts only six to ten years.

The durability of a steel-post fence, like any other, depends on the manner of installation. End and corner posts must be securely anchored in concrete to keep the wires tight and assure resistance to violent shocks. One method of doing this is shown in the illustration. The posts referred to are set vertically in slabs of 18 by 18 by 42-in. concrete, this being done, of course, while the concrete is soft. The steel braces bolted to the vertical posts are anchored in smaller slabs, 18 by 18 by 20 in. in dimensions.

One of the best features of steel-post fences is that there is little or no danger from lightning by which farmers annually lose millions of dollars, as, for instance, when cattle are driven against the fence by a storm and killed by a discharge of lightning conducted along the wire. This will not happen when steel posts are used, as they generally will ground such discharges. Another advantage of steel posts is the speed with which they can be set. One wagonload of posts is enough for a 40-acre field, and a man and boy can drive the lot into the ground in a day, while four men at least would be required to do the same work with wooden posts.



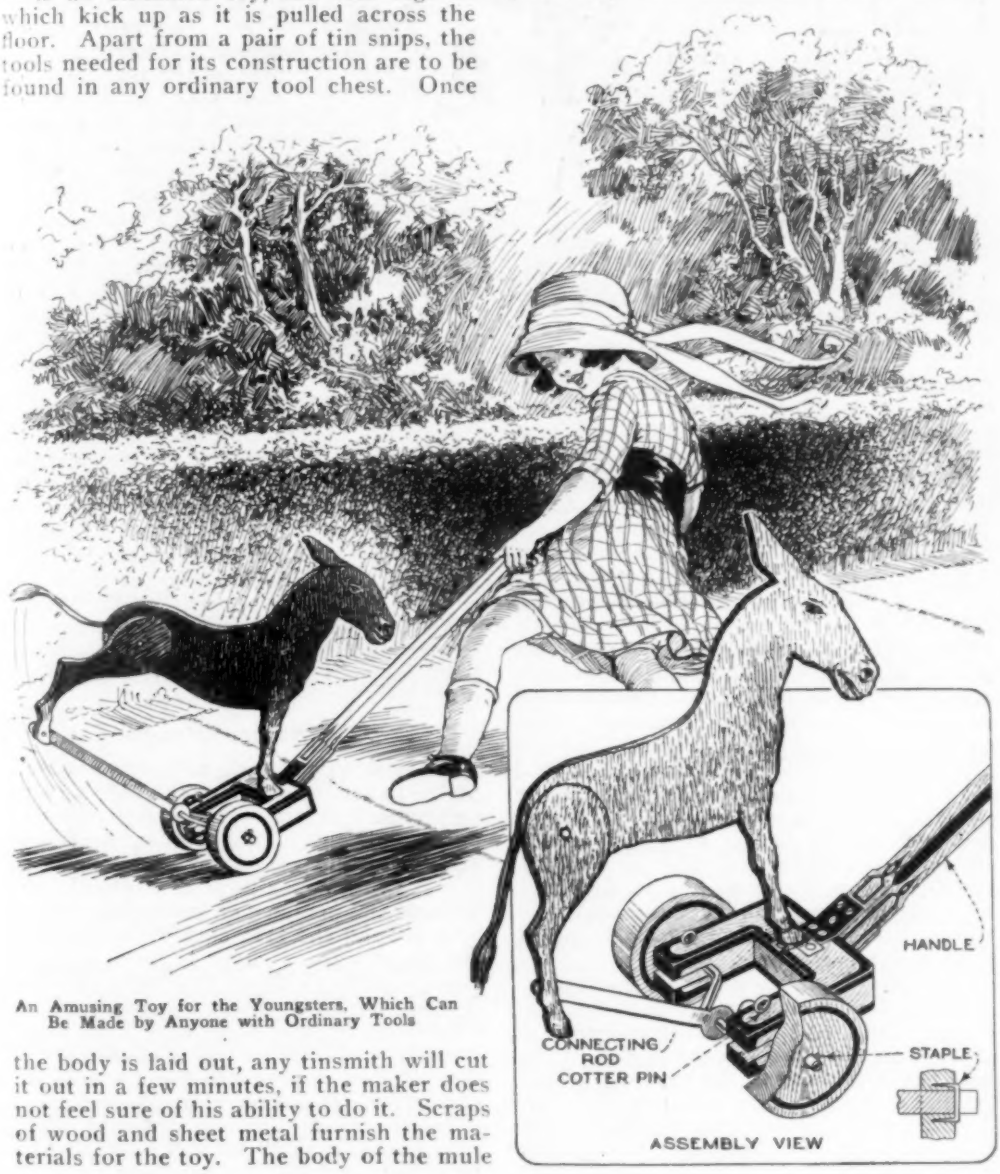
Proper Method of Setting Steel End and Corner Posts in Concrete Foundations



Making a Kicking Mule

By L. R. BUTCHER

THE kicking mule, as its name indicates, is an animated toy, the rear legs of which kick up as it is pulled across the floor. Apart from a pair of tin snips, the tools needed for its construction are to be found in any ordinary tool chest. Once the body is laid out, any tinsmith will cut it out in a few minutes, if the maker does not feel sure of his ability to do it. Scraps of wood and sheet metal furnish the materials for the toy. The body of the mule is made of medium-weight sheet metal, preferably blue-annealed stock, as this

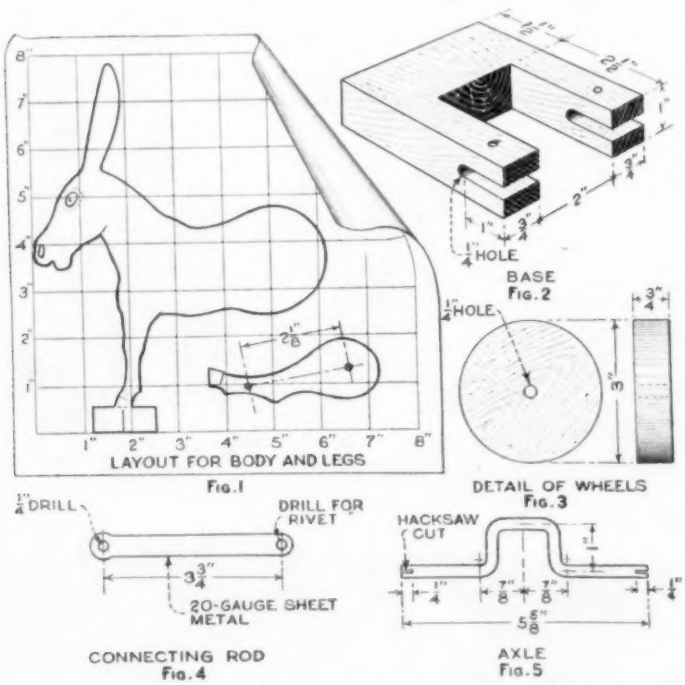


An Amusing Toy for the Youngsters, Which Can Be Made by Anyone with Ordinary Tools

holds paint much better than the galvanized kind. In Fig. 1, a sketch of the body is given. By laying out a square on a sheet of paper, 8 by 8 in. in size, and dividing it into 1-in. squares, the amateur artist can easily lay out the body, drawing the outline in Fig. 1 in the same relative position in each square on the pattern. After making the pattern, the outline is transferred to the sheet metal chosen for the body. As it is almost impossible to follow the sharp curves of the body with the ordinary tin snips, the body should be trimmed to size as closely as possible with them, and the curves filed to the line with a half-round file. The rectangle of metal left on the front hoof of the mule is used to fasten the body to the base. This rectangle is slit up to the bottom of the hoof with the snips, and the two ears thus formed bent in opposite directions, at right angles to the leg. Heavy tacks are used to fasten the bracket to the base.

The base, Fig. 2, requires little explanation. It is made of 1-in. wood, sawed out as indicated. As the axle is bent before it is fitted in the base, the axle holes in the base are slotted out to the rear end; allowing the axle to be inserted from the rear. A cotter pin is used on each side to hold the axle in place. Ordinary ¼-in. round mild steel is used for the axle, Fig. 5. The slots in the ends are made with a hacksaw, and are for the purpose of fastening the wheels to the axle. The wheel is slipped onto the axle and a staple inserted in the slot and driven home into the wheel. The wheel is kept from slipping off by squeezing the split end of the axle together, or by putting a drop of solder in the slot.

The connecting rod, Fig. 4, serves to connect the crank on the axle to the rear legs of the mule. One end is drilled to fit the crank, while the other is drilled to fit a small tinners' rivet. Two rear legs are needed. These are pivoted to the body, one on each side, by a tinners' rivet at their upper ends. The connecting rod is placed between them at the hoofs, and pivoted to them with a rivet near the ankles. All the pivot joints should work freely, yet without undue looseness. The handle can be applied in any manner desired, and the toy may be painted according to the maker's notion of what is fitting. Brown does well for the body, with the wheels and base of some contrasting color. A short piece of cord can be glued to the rear of the body, to serve as a tail. Pulling the mule across the floor causes the legs to kick in a lifelike manner, once for each revolution of the wheels.



Details of Construction of the Kicking Mule, Including a Layout of the Body, to Make It Easy for the Amateur Draftsman

Two Conveniences for the Car

A small article, such as a handkerchief, pad of paper, notebook or the like, is easily lost when it is laid on the front seat of an automobile, as it might then be blown away or drop to the floor unnoticed. To prevent this, sew a band of cloth, about 2 in. wide and hemmed on both edges crosswise around the seat cushion in the center, or, in case a cover is used, sew the band directly to this. The ends only are stitched down, so that the articles can be slipped under the band and held there. Another convenience for the motorist is a small pocket sewed to the front of the seat cover. It is kept closed by means of a flap, fastened with two ordinary snaps. This pocket may be used for carrying an extra license plate or a notebook.

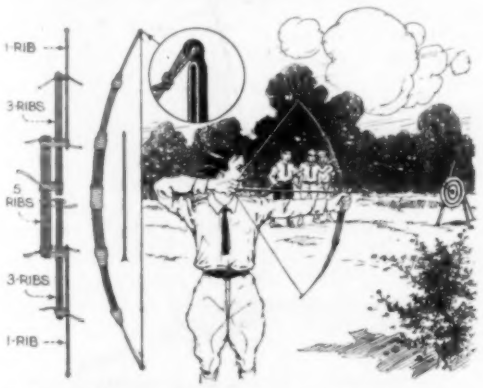
Cleaning Rust from Gun

It is usually quite difficult to keep the barrel of a gun free from rust and it is even more difficult to remove the rust after it has once formed. An easy method of doing this is to plug one end of the barrel with a cork and pour some quicksilver into it. The other end is then tightly corked also, and the barrel is tilted alternately on each end, causing the quicksilver to flow back and forth inside. The result will be an absolutely clean barrel.—Sixten N. Swenson, Harris, Minn.

An Umbrella-Rib Bow

The "stout yew bow" of Robin Hood's days is hard to find nowadays, but a bow made of umbrella ribs will give as much delight to the heart of the small boy.

Separate the ribs from the umbrella by cutting the wire that holds them, and remove the short ribs with a file or pliers. Bind five long ribs together at their centers with twine. Then bind three ribs on each end with their inner ends butting at the center of the bundle of five. Next, bind a single rib, eye outward, on each end, with the inner ends at the centers of the bundles of three. The small eyes at the ends of the outer ribs can be used for attaching the bowstring. The middle of the bow should be neatly served



A Good Substitute for the Yew Bow of Tradition Is Made from Umbrella Ribs

or bound with twine, to prevent the ribs from scratching small hands. Any ribs left over make good arrows if nicks for the bowstring are filed in the ends.

¶Carry a small covered can in the automobile for catching gasoline, for use when making patches and priming the engine.

Ornamental Cover Hides Curtain Top

Ornamental as well as novel in construction and design, a window-curtain covering of the kind shown in the drawing adds a pleasing touch to a Chicago parlor. The

Attractively Painted "Curtain Box" Enhances the Appearance of a Room and Hides Curtain Rods

cover, or "curtain box" as it is called, is made of thin poplar; it is long and wide enough to cover the top of the window frame, curtain and curtain rods, thus hiding this conventional but more or less ugly arrangement. After the cover is finished it is painted and decorated to match the wall paper; in this case it was given two coats of white paint, rubbed down, and then finished with a coat of white enamel. On this scrollwork and flowers were painted, giving a very attractive effect.

Repairing Cracked Aluminum Oil Pans

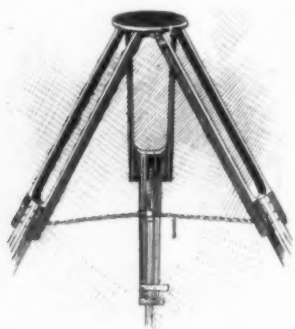
Cracked water jackets and aluminum oil pans can often be repaired satisfactorily with sulphur. Proceed as follows: First clean all the grease and dirt from the surface, using a solution of hot water and sal soda. Permit the surface to dry thoroughly before applying the sulphur. Warm the surfaces with a blowtorch and melt some of the sulphur in a container, taking care that it does not catch fire. Pour the melted sulphur into the crack and allow it to harden. Small cracks in aluminum are easily mended in this way. The repair will be water and oil-proof, provided fire is not allowed to come in direct contact with the sulphur.

Combining Mail Box and Gatepost

Although efforts are made by road builders to beautify the highways, not much has been done to eliminate the ugly rows of mail boxes mounted on posts. However, a progressive Indiana farmer combined his box with a concrete gatepost as shown in the photo. It is out of the way of small children who are usually curious to know the contents; it can not be shot full of holes by a disappointed hunter or ambitious marksman, and does not detract from the appearance of the road.—A. S. Bowes, Chicago, Ill.

Safety First for the Tripod

Camera tripods are easily upset by an accidental touch of the foot against the inside of one of the legs, with the result that an expensive camera may be badly damaged and, perhaps, the lens broken. The same tendency to slipping is experienced when setting up the tripod on surfaces where it is impossible to make the spurs hold. A simple method of preventing this trouble is shown in the illustration. Three 10-in. lengths of furnace chain, a keyring and four snaps are required. Three of the snaps are attached to the ends of the chains and the fourth to the keyring, to make the safety device adjustable. Small screweyes, for attaching the snaps, are driven into the legs of the tripod at the points indicated.—C. E. Weibezahl, Syracuse, N. Y.



Emergency Battery Clips

Galvanized-iron pipe couplings of the ½-in. size have been found to be excellent connectors for storage-battery posts in the absence of the regular clips used for this purpose. The couplings are screwed on the post, the tapered thread cutting into the lead and thus giving a firm electrical contact. The bared ends of the cable or wire can readily be soldered to the coupling. A little vaseline smeared on the post will prevent corrosion and facilitate the removal of the couplings. This connector will stand heavy currents, will fit almost any battery post and will not damage the posts in any way.

Heating Shoe Patches

Cement-fastened patches are often used to mend shoes. The patch is scarfed to a feather edge; it and the shoe are given two coats of leather cement, the first being allowed to harden before the second is applied. To fasten the patch on the shoe, the cement must be softened again by heat, and to warm both the patch and shoe at the same time is usually an awkward task. By blocking up an electric lamp level with the hole in the shoe, however, and placing the patch on the block on the other side, the cement can be equally softened on both with the assurance that the patch will stick solidly to the shoe when it is applied. A small block of wood is placed inside of the shoe before applying the patch, and the latter is carefully hammered down, especially at the edges.

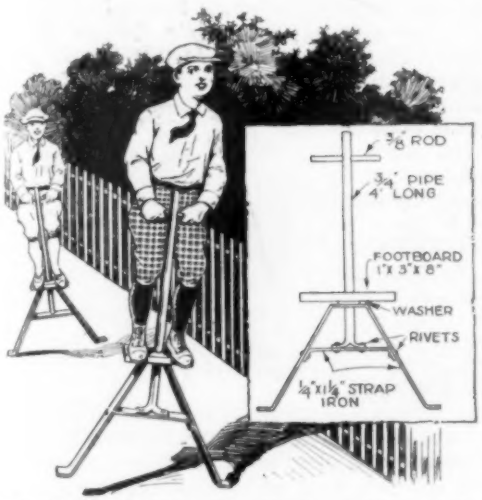
Preventing Draft in Touring Car

A good method of preventing the entrance of drafts at the vertical joints between motor-car side curtains is to sew a strip of curtain cloth, about 4 in. wide, to the rear edge of the front curtain, so as to overlap the rear curtain on the outside. When running at a moderate speed or when headed against the wind, this flap is pressed firmly against the rear curtain, closing the gaps effectively.—E. T. Gunderson, Humboldt, Ia.

New Sport with "Walking Stick"

Stilts and the "pogo" stick are combined in the device shown in the drawing to provide a new sport for the children. The user mounts the footboard and tips the stick toward the left and right alternately with body movements, turning the handle at the same time so that the action of the device closely resembles walking. The steps are of good length and the operation is not tiresome.

The construction of the device is shown in the insert. The legs are made from a length of ¼-in. flat iron about 1¼ in. wide, bent to the shape indicated. A cross brace of the same material is riveted to the legs about halfway between the bottom and top. To this brace a 4-ft. length of ¾-in. gas pipe is riveted, the end of the pipe being slit with a hacksaw and bent, the ears so formed being bent outward, flattened and drilled for the rivets. A footboard, with a hole drilled to fit on the pipe loosely, is slipped over the pipe and rests on a large metal washer placed over the top of the legs. A ⅜-in. rod is driven through a hole drilled near the top of the pipe to serve as a handle. The footboard is loose so that the user can operate the device



The "Walking Stick"—a Combination of Stilts and the "Pogo" Stick

without moving his feet but by giving the handle a twisting motion and swaying the body from side to side.

¶Ebonite and hard-rubber trays can be repaired with a cement made by barely moistening chloride of zinc with water. Sprinkle immediately with oxide of zinc and press the broken parts together.

Portable Barnyard Lantern Stand

On farms not equipped with electric light the use of a lantern is a necessity. In many cases the lantern is hung on a nail

Portable Lantern Stand Proves of Considerable Convenience on the Farm

driven into the wall or a near-by post, but this is not handy because the lantern is not always in a convenient location. A portable lantern stand of the kind shown in the drawing has been found very useful as it can be set just where the light is needed. It consists of a 5-ft. length of 1-in. pipe, a piece of ¼-in. iron rod and a discarded harrow disk. The pipe is securely fastened to the disk by means of two nuts as indicated in the detail. The iron rod is bent, as shown, to form an eye at the top for holding the lantern, a wire hook being slipped through the eye for this purpose, and the ends of the rod are then pushed into the open end of the pipe. The whole outfit is light in weight and can be carried around readily.

Storing Table Leaves

It is often a problem, especially in small houses where space is usually very limited, to dispose of extra table leaves when they are not in use. A handy closet can readily be made for them by removing the plaster between two studdings so that the leaves will fit in. This opening is then embellished by providing a casing and a door, made from 1-in. material. A 3/16-in. iron rod slipped through two screweyes serves to keep the leaves in place.—T. F. Wait, Santa Ana, Calif.

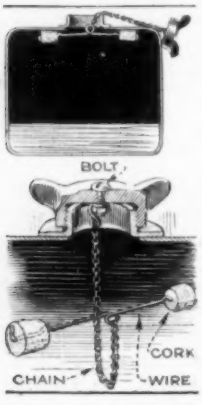
Novel Use for Old Book Covers

Covers of discarded books and catalogs can be made into excellent letter-filing boxes. After removing all the leaves, a

Letter-Filing Boxes Made from Covers of Discarded Books; the Frame Is of Thin Wood

frame is made of thin wood to fit inside the covers. Its dimensions should be such that the front and back covers will lie level when the frame is inserted between them, and overlap the frame ½ in. at the top, front and bottom. The back cover is glued and tacked to the frame, and the back is also glued to the side. To strengthen the joint between the top of the frame and the back, a linen strip, about ½ in. wide, is glued over the joint. A small catch is fastened to the front cover and a pin for this catch is fitted on the side as shown.

Preventing Loss of Gasoline-Tank Cap



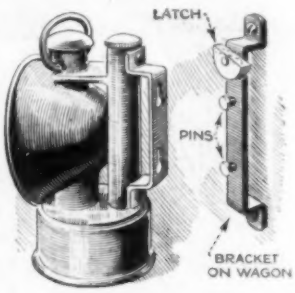
The caps on gasoline tanks and radiators are often lost, especially when filling is done in a hurry and the caps are screwed on quickly but not tightly. Even vibration sometimes causes them to loosen and gradually unscrew. A simple method of preventing loss of the cap is shown in the drawing. A hole is drilled through the cap for a small stove bolt, and a lug and lock washer are then slipped under the nut, as indicated. A short length of ordinary furnace chain is attached to the lug and to the center of a heavy-wire crosspiece, to which a cork is attached at each end. This crosspiece is retained inside of the tank or radiator and holds the cap if it falls off.—C. A. Champion, Detroit, Mich.

Flexible Filler Cement

An excellent filler cement or putty can be made from 1 lb. dry glue, 1 lb. powdered cement and 8 oz. glycerine. The glue is melted in ½ pt. water and the cement added; after the ingredients are well mixed by stirring, the glycerine is poured in. The mixture should be applied hot. It will harden with a surface resembling old leather and will be very flexible. If it is to be used where water or dampness can attack it, it should be protected by one or two applications of shellac and a coating of paint or varnish.

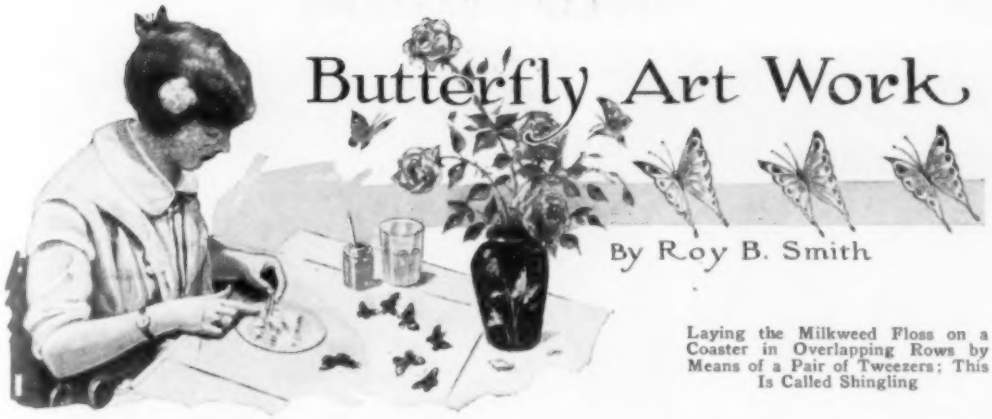
Bracket for Wagon Lantern

Practically every state has laws which require horse-drawn vehicles to carry a lighted lantern, or some kind of light, at the left side of the vehicle, during night use. It is, of course, best to provide a permanent bracket to which the lantern can be conveniently attached whenever necessary. The construction of such a bracket is shown in the illustration. It holds the lantern securely, yet permits instantaneous removal. The part attached to the wagon consists of a piece of ⅛-in. flat iron, about 1½ in. wide, bent and drilled at the ends as shown, so that it can be attached to the wagon with wood screws. Two pins are riveted or welded to it, and a small swing latch is provided at the top which is pivoted eccentrically so that jolting of the wagon will not cause it to lose its grip on the lantern part. The latter piece is similarly made and is attached to the lantern handle. Two holes are drilled in it to fit over the heads of the pins, and slots are cut upward from the holes to slip it down on the pin shanks.



Butterfly Art Work

By Roy B. Smith

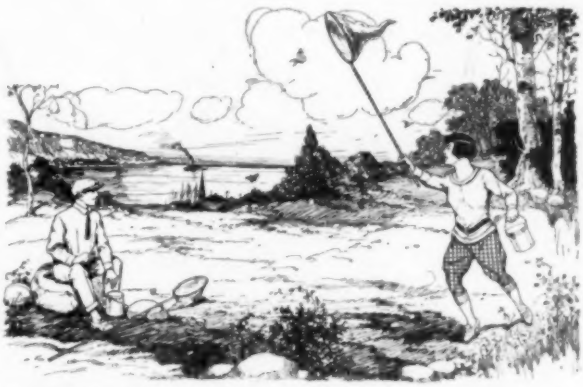


Laying the Milkweed Floss on a Coaster in Overlapping Rows by Means of a Pair of Tweezers; This Is Called Shingling

THOSE who design dress goods, table linen, wall paper, magazine covers, in fact, designers in almost every branch of decorative art, have used the butterfly motive with splendid effect. It is only within the last few years, however, that an art has sprung up that utilizes the brilliant coloring of the real butterfly, assisted by the natural grasses and flowers that form its background in nature, to decorate articles for the home. This is an art at which anyone may become an adept. The technique is not at all difficult, and once acquired, progress is limited only by the natural talent of the designer.

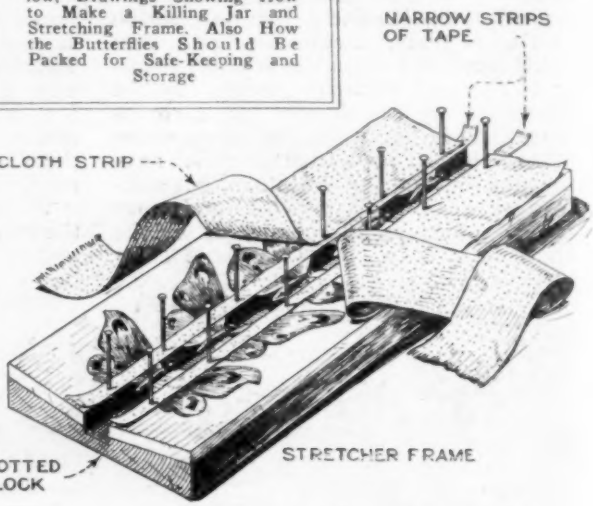
First, of course, you must catch your butterfly. For this purpose a butterfly net, such as can be purchased at any sporting-goods store, is necessary. A killing jar is also essential; this may be made by fitting a fruit jar or can with a paper partition, under which some crystals of potassium cyanide are held in damp sand or sawdust. The partition is made by cutting a disk out of stout paper, about 1 in. larger in diameter than the jar, and marking on this another circle the diameter of the inside of the jar. The outer edge of the disk is then slitted radially as shown in the illustration, the cuts being carried to the inner circle, and the edge then folded up at right angles. After the potassium-cyanide crystals have been placed in the jar, coat the upturned edge of the disk with glue, and slip it down into the jar. A few holes are punched in the paper for the gas to come through, and the cover of the jar made tight-fitting, and the job is done. As potassium cyanide is very poisonous, great care should be exercised in handling it. The hands should be washed thoroughly after placing the crystals in the jar—in fact, it is better to place the crystals by means of tweezers, and avoid handling them at all. Also, care should be taken not to inhale the gas given off in the jar.

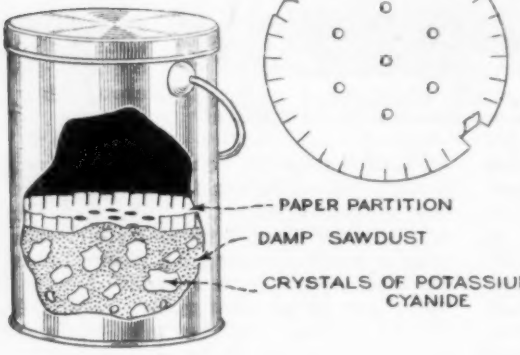
When a butterfly has been enmeshed in the net, take hold of its body, from the outside of the net, and from below, holding it tightly to prevent escape or fluttering. Insert it in the jar, and close the cover as far as possible before letting the butterfly go. If the gas is strong, it will cease to flutter almost at once, but it should always be left in the jar at least 20 minutes, or it may revive upon being brought into pure air. When dead, remove the insect from the jar with a pair of tweezers, and at once place it in a paper, folded as shown in the drawing, with the wings up together in the natural position. In this way it can be handled many times without risk of damage, and occupies but a small space. If desired, the butterflies may be mounted on a stretcher frame, made as shown in the drawing, until ready for use, but for our particular purpose this is not essential. Those who wish to make such

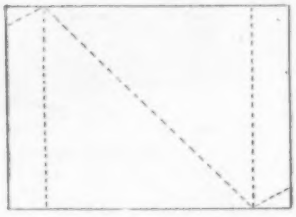


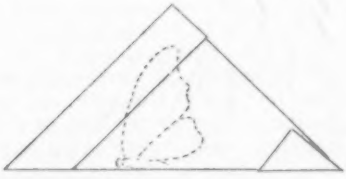
Butterfly Art Work Not Only Is an Interesting and Remunerative Hobby, but Provides Healthy Sport in Collecting Specimens

Upper Left, Placing the Glass on the Floss: Above, Gluing Wings to Artificial Body: Left, Dropping Floss into Well: Below, Drawings Showing How to Make a Killing Jar and Stretching Frame. Also How the Butterflies Should Be Packed for Safe-Keeping and Storage









METHOD OF PACKING

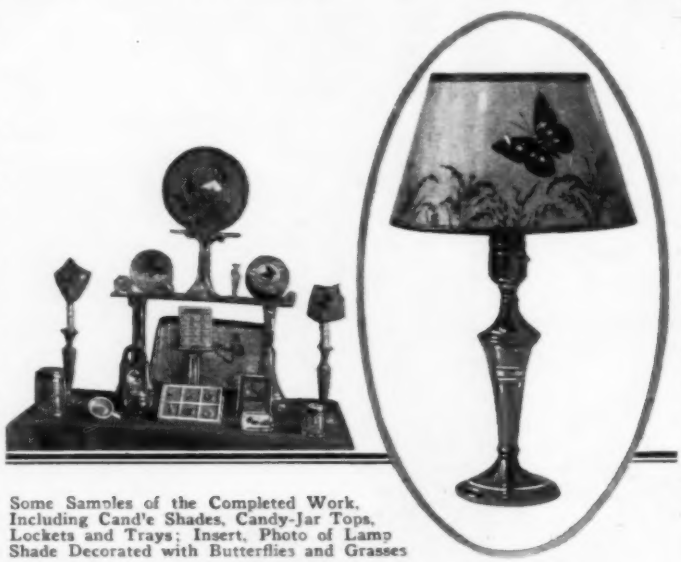
Designing the Tray; the Designer Lays the Butterflies and Grasses on the Milkweed Floss by Means of a Pair of Tweezers

Trimming Off the Projecting Floss and Grass Stems; Here the Glass Is Clipped to the Back

Above, Binding the Edge of the Completed Tray; Left, Cutting Off Seeds and Lower Ends of Milkweed Floss in Preparation for Laying It on the Glass by the Shingling Method

a frame, however, will find sufficient detail in the drawing.

Of course, it is not essential that you catch your own butterflies. Indeed, if you wish to use some of the most beautiful specimens it would not be possible to catch them, as they are not natives of the North American continent. For those who prefer to allow others to do their hunting for them, there are several dealers that make a specialty of buying butterflies from the four corners of the earth and preparing them for this kind of work. The insects will keep indefinitely if stowed away with moth balls in a cigar box, but they are all ready to mount within a week or two after capture. The space allowance for butterfly art work is too small in most articles to allow the real body to be used, and it is doubtful if this is desirable practice under any conditions. It is advised, therefore, that the wings be detached from it and an artificial body cut from celluloid, cardboard or heavy paper, to which the wings may be glued. The artificial body is fitted with antennae made of hairs taken from a black bristle brush, and if properly painted and shaded, looks so natural that one has to look twice before it can be noticed that any part of the insect is missing. So prepared, the butterfly lies flat, and may be kept in a book until ready for use. It will go splendidly under glass, in a tray, plaque or locket, and lies flat against the transparent cover, showing its greatest wing expanse and beauty unimpaired by distortion.



Some Samples of the Completed Work, Including Candle Shades, Candy-Jar Tops, Lockets and Trays; Insert, Photo of Lamp Shade Decorated with Butterflies and Grasses

Butterflies may be effectively used as part of a picture made by brush, pastel or air brush, with a background of ground glass, frosted celluloid, canvas, parchment or silk, and for those skilled in these mediums many lovely effects are possible. For most of us, however, nothing will exceed the charm of the pieces made by the use of nature's material all the way through. Backgrounds made with milkweed floss from the pods of the lowly roadside weed, pressed summer grasses carefully selected, and such dried flowers as the African everlasting, which have been found permanent in color, are the most effective. When these are combined by an artist in a picture with a perfect and lovely butterfly, the result is well worth while.

To make a tray, cut a piece of cardboard to the size of the glass to be used and cover it with a sheet of cotton wadding of the same size. Build a "well" of cardboard or celluloid around it, then take a milkweed pod and open it by cutting the "thread" that binds it together and breaking away the bottom of the pod. Pull out a pinch of the fluff with the adhering black seeds, flick off the seeds into a waste box and then drop the floss into the well. Keep on in this manner until you have used a dozen or more pods, or until the fluffy pile on the wadding has reached a depth of about 8 in. Then lay on a glass disk, which has previously been cleaned, and allow it to stand overnight.

When ready to go ahead again, have the grasses laid out, with the butterfly and any flowers that you wish to use, together with a pair of tweezers for adjusting the background and handling the butterfly. Remove the glass slowly and carefully, and the floss will fluff up but an inch or two. You can now lay on the grasses as artistically as possible, then the flowers, and last of all the butterfly. The eye has a tendency to follow the direction of flight, so it is well not to place the insect so that it appears as if it were flying out of the picture. Carefully put on the glass again, and clip the underlying cardboard to it with strong paper clips. Cut off all the projecting floss, grass stems, etc., and bind the glass and cardboard all around the

edge with surgeons' ½-in. tape. This completes the insert, and it is now ready to be sent to the frame maker's, or you may put it in that old mahogany tray to cover up its unsightly marred frame.

In other kinds of work, such as the tops of pocket mirrors, small designs for candy boxes, lockets, calendars and Christmas cards, it is better to lay the milkweed instead of dropping it. In laying it you must cut off the bottom part of the floss fiber so that it will lie down and not fluff up. Lay across the center of the picture a line of floss, using the tweezers to handle it and arranging the fibers vertically. Do not make the line too formal. Give it a poke up here and a pull down there to take the stiffness out of it. Now lay another row overlapping or "shingling" the first, and so on, until the lower part of the background is filled with a solid iridescent coating of gleaming white floss. On this lay carefully the grass and butterfly design, and bind the glass or celluloid cover to the cardboard back with gummed-paper tape. For the top or sky part of the picture most people prefer a sort of sky-blue paper imported from Japan, but very pretty effects may be secured with satin or hand-tinted backgrounds on ordinary water-color paper. Whatever is used must be clipped to the cardboard back before the work is started, and the milkweed laid well up on it to conceal the lower edge.

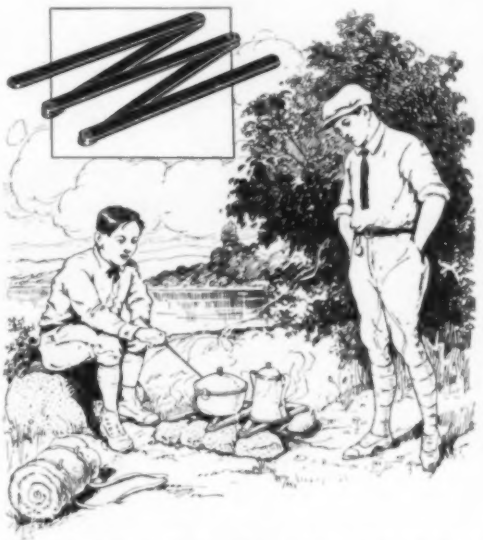
When making coasters, plaques, lamp shades or candle shields, glass or frosted celluloid is used as the base, on which the floss is laid directly, in the manner just described. The butterfly may be secured to the background by a dab of glue. "Starring"—the name given to the process of picking out individual "parachutes" of floss and so spreading them on the top part of the background as to produce a raylike effect—may be used here. It is beautiful when properly done, but requires a perfectly still room and much patience.

At the holiday seasons and in wedding time, there is an active demand for artistically made trays, mirrors, lamp shades, and other articles, and those who have become proficient in the technique and have studied the principles of design, should have no difficulty in obtaining orders, at remunerative prices, for all of this work that they care to do.

¶If a film negative is badly scratched, the marks will show in an enlargement in the form of dark lines. This can be prevented by coating the film with vaseline just before inserting it in the enlarging camera.

A Simple Camp Grate

A simple and convenient camp grate that does not take up much room and can easily be made by anyone, is shown in the drawing. It is made from a number of 18-in. lengths of ⅛-in. flat iron, about 1 in. wide. These lengths are pivoted together at the ends as shown in the upper detail,



Campers' Fire Grate, Which Can Be Folded Up Compactly When Not in Use

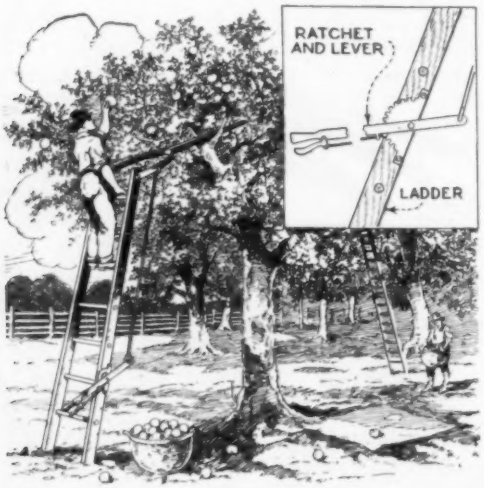
which arrangement permits them to be folded compactly or drawn out for use. The fire is made between two rows of rocks, as flat as can be found and of fairly equal height, as shown, and the grate placed on top of them. When not in use, the grate is folded up and put in a canvas pocket made to hold it.—Robert Page Lincoln, Hopkins, Minn.

Cranking a "Stiff" Car

After repairing a car by fitting some new bearings and taking up the old ones, it was found impossible to crank the engine, and a heavy snow prevented towing the car. However, the following scheme proved effective: Another auto was run up alongside it so that the two adjacent rear wheels of both cars were in line and could be lashed together with a rope. The axles of both cars were, of course, jacked up to keep the wheels in alinement and prevent the cars from moving. The second car was then started and both cars thrown into high gear with the result that the first one was quickly started.—Ralph Jackson, Orono, Me.

Handy Orchard Ladder

Pruning and fruit picking can be accomplished in a shorter time and with less damage to the trees with the specially devised ladder shown in the illustration, than



Novel Ladder with a Movable Extension Facilitates Pruning and Fruit Picking

is possible with the use of an old-style ladder. Upon the upper end of a common ladder a forked extension, made from a length of 2 by 2-in. oak and two lengths of tire iron, is hinged to swing up and down. It is controlled from below by a lever and ratchet fastened to the side of the ladder, about 4 ft. from the lower end, a discarded cultivator lever being used for the purpose. The lever is connected to the extension by means of a ½-in. steel rod, so that the movement of the lever causes a corresponding movement of the extension. The object of the extension is to hold the ladder at convenient distances from the trunk so that any part of the branches can be reached. The extension, being inserted in a crotch, will form a safe support and prevent such damage to the tree and fruit as might result from forcing an ordinary ladder between the branches.

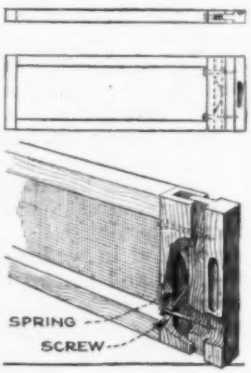
Carbon-Monoxide Poisoning

Although the danger of carbon-monoxide poisoning in closed garages has been emphasized repeatedly, warnings concerning the harmful effects of this gas produced by the combustion of fuel in houses are comparatively rare, and it happens frequently that people die from poisoning by exposure to this gas in unventilated rooms during the winter season. Many house heaters have no flues for carrying off the combustion gases and this means that they stay in the room. If all the windows and doors are closed for any length of time, as is often the case during winter months, the effect of the undesirable gas and the lack of oxygen becomes apparent by causing the occupants to become dull and sleepy, many cases being on record which have ended fatally. As a precaution the window should always be partly open when a gas heater without a flue is used. It has been determined by the U. S. bureau of mines that the atmosphere in a room should be changed at least once every hour, and this is best accomplished by keeping the window open about an inch at the bottom and also at the top. In no case should the heater be left burning with the windows closed, when retiring.

The danger also exists wherever an internal-combustion engine is used, if the exhaust pipe leaks and does not carry away all the gas. And in closed automobiles where exhaust heaters are often used, proper circulation of fresh air is imperative, as the heater may leak or the exhaust gases may get into the car from below.

Self-Adjusting Window Ventilator

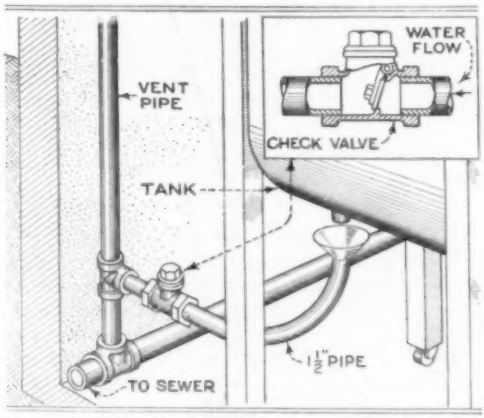
Adjustable window screens of the sliding or telescoping kind are not very durable due to their light construction, and as the two screens do not always fit against each other tightly there is apt to be an opening for flies to creep through. A much better and stronger adjustable window screen, which eliminates this undesirable feature and is much easier to put in place, is shown in the illustration. It consists of a screen tacked to a sturdy frame of 1 by 2-in. wood, and with a movable endpiece that automatically springs against the window casing as soon as it is released. The construction of this end is as follows: The end of the frame is grooved for its entire length and about two-thirds of its depth. An equal length of 1 by 2-in. wood is rabbeted on both sides to form a tongue, to fit loosely in the groove. A length of corset steel, bent to a semi-circular shape, with the ends turned up slightly, is in-



serted in the center of the groove as shown, and two 3-in. round-head screws are used to hold the two pieces of wood together. Holes are drilled in the grooved piece for the screws to fit in loosely, but the threaded ends of the screws are driven firmly into the tongue. This arrangement allows the endpiece to be pressed inward, and the spring pushes it back again. A finger groove is provided in the endpiece to facilitate removal of the screen.—M. C. Everett, Chicago, Ill.

Drain Pipe for Washing Machine

Removing used water from a washing machine by the pailful is a slow and laborious task and the drain pipe shown in the illustration will therefore be appreciated. It consists of a 1½-in. pipe, bent and flared as shown, and fitted on the vent pipe. A check valve of the horizontal-swing type is used to prevent sewer gas from backing into the room. This is better than a gooseneck trap, which would allow the dirty and soapy water to remain in the trap between wash days and possibly give off undesirable odor. The flared end of the drain pipe may be a funnel of sheet iron soldered to its end. The washing machine is placed so that its drain cock is over the funnel, discharging the dirty water directly



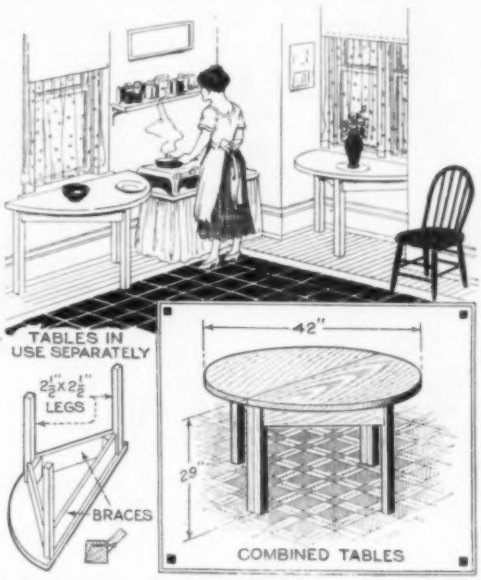
Connecting the Washing Machine to the Drain Pipe through a Check Valve

into the sewer. The connection also provides an excellent method of flushing the sewer pipe.

¶ Electric lamps which have become loose in their bases can be used for some time by running liquid glue into the space between the bulb and the base. If the glue is too thick to run between the parts easily, it can be thinned by heating.

Half-Round Tables Conserve Space in Kitchen

There is little space to spare in the modern apartment kitchen, or rather kitchenette; the table shown in the drawing,



Where Space Is at a Premium This Sectional Table Will Prove of Value

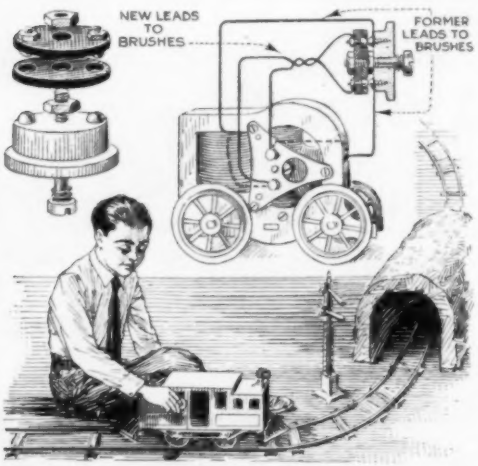
therefore, will appeal to dwellers in such buildings. It is made in two half-round sections, the diameter being 42 in. and the height 29 in. As may be seen from the drawing, the construction is simple and well within the ability of the amateur cabinetmaker. Practically any wood may be used, and the table finished in enamel. When the two halves are used separately, the flat side is set against the kitchen wall, and as each is provided with three legs, they are quite steady. Placed together, they make a dining table large enough for four persons.

Waterproofing Ignition Leads

Most owners and drivers of Ford automobiles have experienced the detrimental effect of water on the high-tension ignition leads, as the water causes them to be short-circuited. It has been found that a liberal application of shellac over the wires will waterproof them effectively. After becoming wet they can readily be dried off, and there will then be no danger of short circuits. The covering of shellac also protects the rubber against oil which destroys the rubber quickly.

Reversing Switch for Toy Locomotive

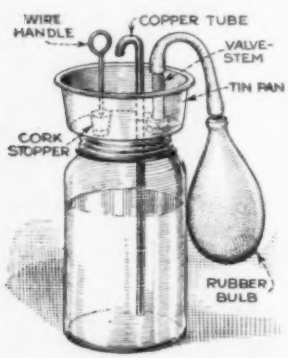
A toy electric locomotive is more interesting to the boy owner if it is reversible, but engines equipped with a reversing switch cost much more than others. However, a simple reversing switch can readily be made by any boy from a small wooden spool, and two fiber disks of the same diameter. A center hole is first drilled through all three for a bolt with which the switch is attached to the engine. Two small round-head screws are driven into the spool near the edge and directly opposite each other. Two corresponding holes are drilled through each of the disks; those in the upper disk being equal to the diameter of the stem of two small bolts, which are later pushed through as shown, and the holes in the lower disk a trifle larger than the heads. The wires leading to the brushes are then detached and fastened under the heads of the small screws driven into the spool, and two other leads are run from the small bolts in the upper fiber disk back to the brushes. The heads of the bolts touch the heads of the screws and thus permit a constant current to flow. Turning the disks halfway around by means of the head of the central bolt reverses the direction of the current and consequently reverses the direction in which the locomotive is moving.



Direction of Toy Locomotive Reversed by Small Switch Which a Boy Can Make

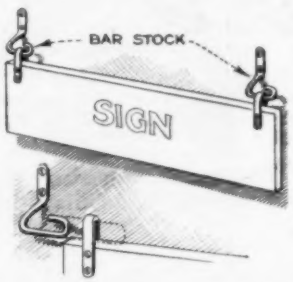
Safety Container for Cleaning Fluid

It is common practice in tailor shops and pressing establishments to have an open pan of gasoline or other cleaning fluid on the workbench for dipping the cleaning brush; but besides being wasteful, this method is dangerous, and therefore a Wisconsin tailor devised the safety container shown in the drawing. It consists of a fruit jar with a small pan soldered to the cover. Three holes are punched or drilled through the pan and cover; one to receive a bent copper tube, one a stopper with a wire handle, and the third a valve of an old inner tube. The copper tube and valve stem are soldered in the positions shown, the lower end of the tube being about ½ in. above the bottom of the jar. A rubber bulb is attached to the valve by means of a length of rubber tubing. In use, the jar is filled, the cover screwed on and the bulb is used to force air into the jar, causing the fluid to rise through the copper tube into the pan. When the cleaning work, or spotting, is finished, the stopper is removed, allowing the liquid remaining in the pan to flow back into the jar. The replacement of the cork prevents evaporation and accidental ignition.—G. E. Hendrickson, Argyle, Wis.



Wind-Proof Hanger for Signs

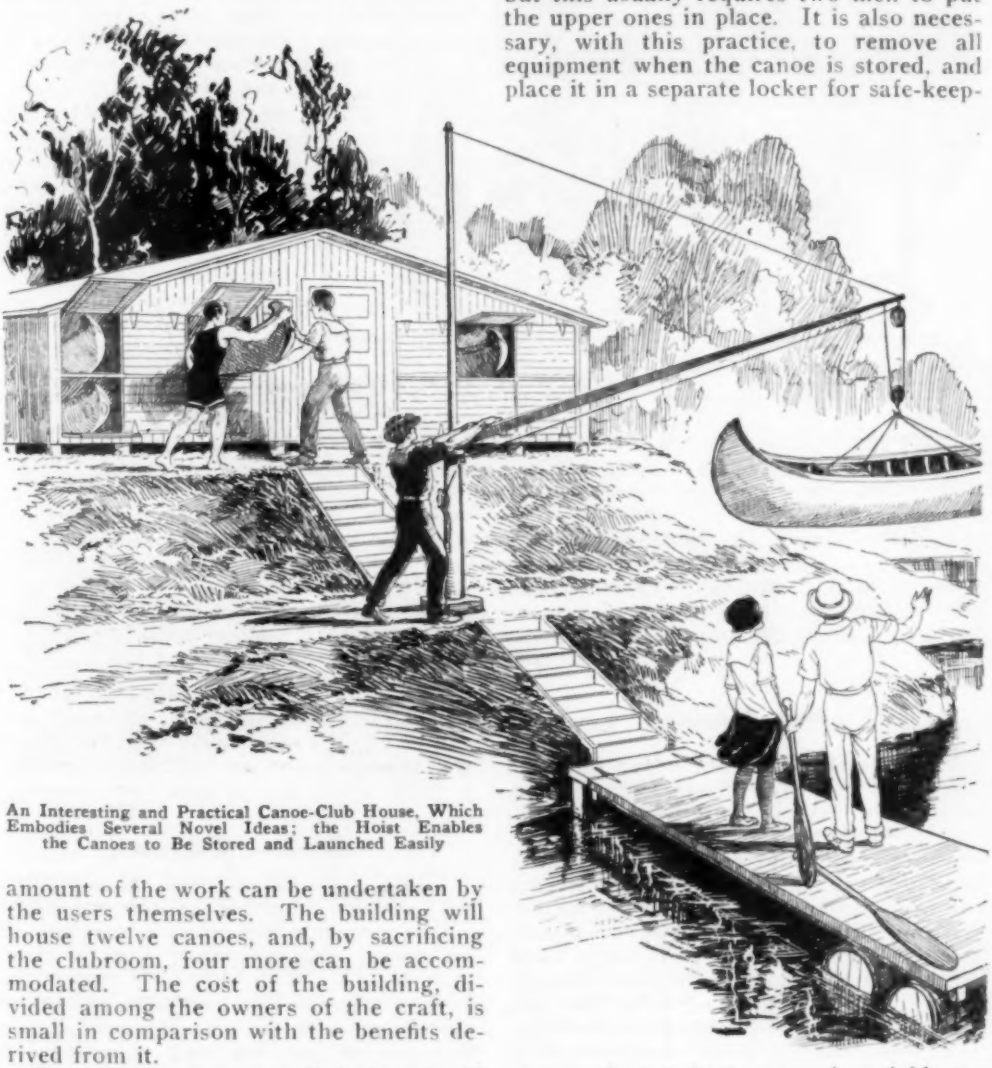
The drawing shows a pair of wind-proof hangers for a sign that has to be changed frequently, such as are used on trains and street cars and in other similar cases. The hangers are made of round bar stock, bent to the shape indicated and screwed in position. The signs are provided with eyes large enough to slip over the hangers. When once in position the sign will not come off unless a vertical force is applied and this can only be done manually.—A. C. Cole, Chicago, Ill.



Boathouse for Small Canoe Club

By WALTER X. BRENNAN

THE boathouse described in this article was built by a small canoe club in a little Michigan town, and, in addition to storing the craft, it afforded the members a meeting place for the winter months, and kept the spirit and enthusiasm of the members alive during the periods when they could not indulge in their favorite sport. The total cost of the building was $400, and it can be duplicated for approximately this amount in any part of the country—probably much less if any great amount of the work can be undertaken by the users themselves. The building will house twelve canoes, and, by sacrificing the clubroom, four more can be accommodated. The cost of the building, divided among the owners of the craft, is small in comparison with the benefits derived from it.

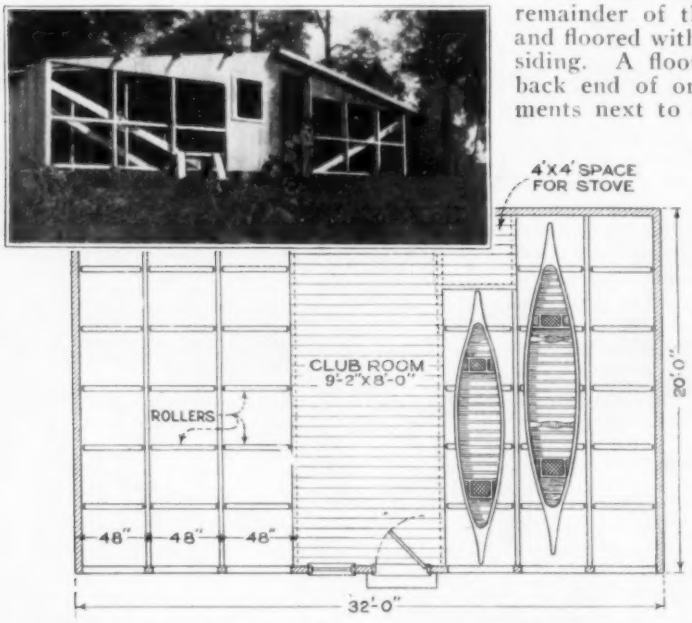


An Interesting and Practical Canoe-Club House, Which Embodies Several Novel Ideas; the Hoist Enables the Canoes to Be Stored and Launched Easily

The building measures 20 ft. deep by 32 ft. wide, which allows placing six canoes on either side of the clubroom, the centers of the compartment partitions being 4 ft. apart. If the clubroom space is not desired, eight canoes can be placed on the ground level, and eight on the upper tier. The framing is made of 2 by 4-in. stock, the vertical members being 4 ft. apart. The siding is of 6-in. matched lumber, applied vertically, and the roofing boards are 12-in. second or third-grade material, covered with composition roofing.

It is the usual practice to store canoes on brackets or shelves in one large room, but this usually requires two men to put the upper ones in place. It is also necessary, with this practice, to remove all equipment when the canoe is stored, and place it in a separate locker for safe-keeping—and such lockers are invariably too small for the users' requirements. In this boathouse, however, all canoes are slid into

place from the front of the house, each having its own separate compartment with a door at the end, which may be locked by the owner of the canoe. All equipment may thus be left in the boat and be perfectly safe. In addition to this, one man can easily raise one end of the canoe to the door sill, then lift the other end and slide the craft into its compartment. The compartments are partitioned with chicken wire, which allows the air to circulate throughout the building, to keep the craft dry. The doors for the compartments are made of siding, the lower ones being hinged at the bottom so that a roller may be mounted on each door for additional ease in handling the canoes; the upper doors are hinged at the top so as not to interfere with the lower openings. The "floor" of each compartment consists of rollers, the pivots of which run in holes in the framing. These may be spaced as thought necessary.



Floor Plan of Boathouse, Showing How the Canoes Are Stored; Insert, Building Under Construction; Note the Compartment Framing

The clubroom is partitioned from the remainder of the house with wallboard, and floored with the material used for the siding. A floored space is made at the back end of one of the canoe compartments next to the clubroom, in which a stove may be set up in winter. A full-size door, with glass upper panels, is used at one end of the room and a window at the other. As this house is on a bank 8 ft. above the water, a mast and boom are mounted halfway down the bank so as to enable the canoes to be lifted from the water and swung around in front of their berths. Two single pulleys and the necessary rope permit the average canoe to be raised easily; the end of the rope is fastened to a cleat on the mast. The butt of the mast rests in a concrete socket in the ground. The water level at this place is variable, so a semi-floating dock is used. Four barrels, lashed together, support the outer end, while the shore end is hinged to a permanent sill, so that the dock may rise and fall with the water level.

Laying Linoleum

When laying linoleum never butt the seams and tack to the floor along this line, so that the cutting must be done at the outside edges, but tack only the latter first, allowing approximately 1½ or 2 in. to overlap at the seams. After all the stretch has been worked out by walking on the linoleum a few days, a straight cut is made through both layers, a very sharp knife being, of course, used to do this. The resulting joint will be a tight fit, and the edges are then tacked to the floor by means of headless tacks. Many think that it is necessary to give linoleum a coat of varnish to preserve its surface, but floor wax will serve the same purpose, is cheaper and can be applied with much less trouble. If well rubbed in and polished, it will produce a finish which is dirt and wear-resisting.

Non-Skid Rubbers

Those who have been annoyed by rubber heels skidding in rainy weather will appreciate the simple method of preventing this by cutting slots in them with a saw. The slots will cause the heel to grip the wet pavement firmly, no matter how slippery it is. In men's heels, three or four cuts are made each way, but in ladies' heels, two or three oblique cuts are sufficient.

Hints on Varnishing

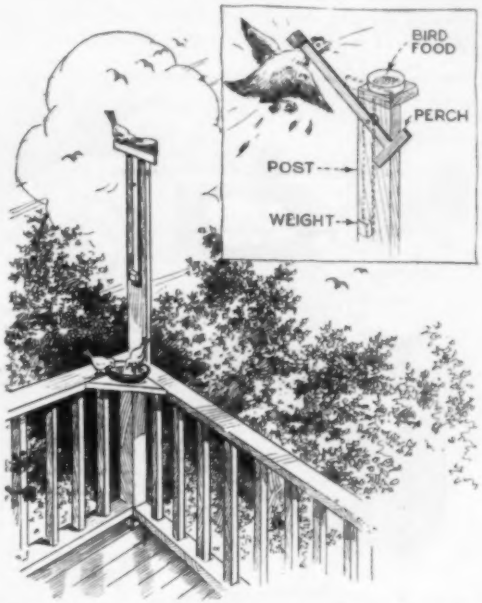
Many amateurs fail in their attempts to do a good job in rubbed-varnish work because they do not take the important factor of temperature into consideration. The best temperature for interior varnishing is from 80 to 85° F., as the varnish will then flow evenly. All doors and windows should be closed tightly so that drafts will not vary the temperature, and also to prevent dust from being deposited on the varnish, which is another cause of poor work. The varnish should be applied sparingly, as too thick a coat will wrinkle upon drying. Vibration of the floor above must be guarded against as it loosens dust particles on the walls and ceilings which will settle on the varnished surface. After one or two coats of varnish are applied and these rubbed down with pumicestone powder and water, a thicker coat is applied and this rubbed down with rottenstone powder and crude oil. The varnish will set quickly when the room is allowed to cool gradually by opening the doors only.—L. H. Georger, Buffalo, N. Y.

Making an Ax Cut Easily

When a series of grooves is ground in the sides, as shown in the illustration, an ax will sink up to the eye in wood with very little effort. This is a simple kink, long kept secret by woodsmen and lumberjacks, who seem to make saws and axes do most surprising things. The cause of the greater efficiency of the ax is that the surface of the blade is lessened, and consequently the friction reduced correspondingly.—J. T. Garver, Huntingdon, Tenn.

Chicken-Proof Bird Feeder

Many people feed birds by putting grain or bread crumbs on a post. However, if there are any light chickens around, such as leghorns, they can fly up on the post and devour the food. A simple and effective method of preventing this is to provide a movable perch, pivoted on the post as shown in the drawing. As soon as a



Movable Perch Used to Make Bird-Feeding Post Inaccessible to Chickens

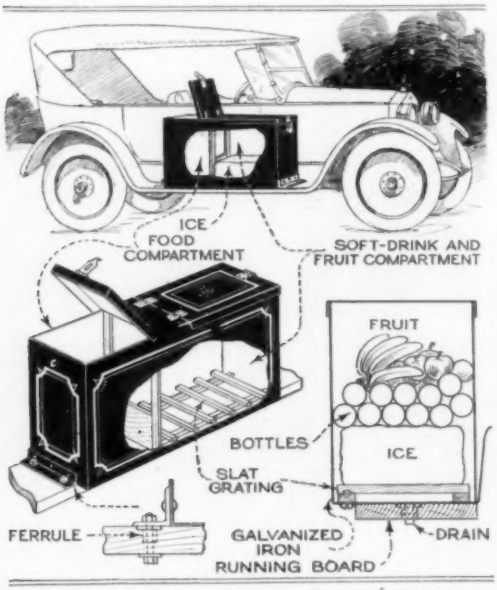
chicken alights on the crosspiece the perch becomes topheavy and turns upside down, the other end, which is suitably weighted, swinging around and striking the chicken "in the neck," which will soon effect a cure without fatal results. On the other hand, the perch will not be upset in this way by the weight of smaller birds. The general method of making such a perch is clearly shown in the drawing, and the point to pivot it varies with the size of the perch and the weight of the wood.—J. F. Hobart, Dunedin, Fla.

Using Broken Chain-Pull Sockets

Electric chain-pull sockets are usually thrown away as soon as the mechanism is sprung or broken, which puts the switch out of order. If the sockets are otherwise in good condition, they can be used without the switch mechanism as plain keyless sockets. In pull sockets one of the lamp-cords is connected to the threaded shell into which the lamp screws and need not be changed; the other is connected to the flat spring which contacts with the center of the lamp by means of the moving parts. The latter are removed and a short insulated wire is soldered to the spring and to the center of the socket.

Detachable Running-Board Ice Box

A detachable running-board ice box of the kind shown in the illustration has been found to be of great value on camping trips. It is made of heavy galvanized iron,



Detachable Ice Box on Running Board Is Useful on Camping Trip

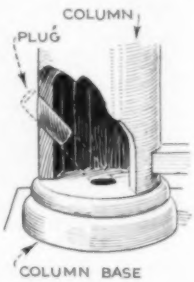
has a compartment for the ice, upon which fruit and soft-drink bottles can be piled, and another compartment for bread, cakes and food that must be kept dry. Two hinged covers are fitted to the top, as indicated, and a slat grating is provided in the bottom to allow easy drainage. The whole arrangement is fastened to the running board by means of four bolts passing through two angle-iron brackets, which are riveted to the ends of the box, and through holes drilled through the running board and bushed with ferrules. The ferrules are turned up out of brass stock and are threaded with a fine-pitch thread so as to permit screwing them into the wood; these have a nicer appearance when the box is detached than plain drilled holes. A drain hole is drilled through the bottom of the ice compartment and through the running board. A ⅜-in. nut is soldered in this hole and a screw plug fitted in, a rubber washer being provided under the head.

Small Scale Made from Test Tube

A simple and accurate scale for weighing small quantities of chemicals can be made from a glass tube such as developing powders are sold in, or any ordinary test tube. The bottom is weighted down with fine shot, fixed in place with sealing wax, and a cardboard disk, cut to fit snugly, is fastened over the top with sealing wax also. By immersing the tube in water and weighting it down with small druggists' weights, the proper graduation marks can be made on the tube with the aid of a sharp file.—George Parke, Winter Park, Fla.

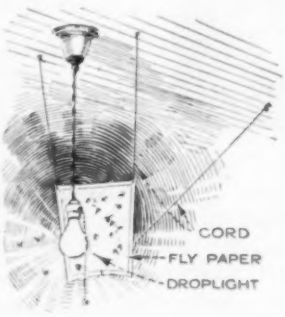
Preventing Columns from Rotting

Porch columns and posts cannot be painted on the underside where they rest on the floor, and as a consequence this end is the first to decay, as water running down the post seeps under it and cannot dry out quickly. This trouble can be overcome and the end protected against decay by drilling a diagonal hole at the base of the column as shown. A half-and-half mixture of linseed oil and turpentine is poured into the hole, and a wooden plug is then driven in to prevent evaporation of the mixture. The result is that the oil penetrates the wood and makes it impervious to moisture.



Catching the "Bugs"

Continually annoyed by insects flying around his electric lights at night, and finding that he could not entirely exclude them from his shop by screens, as some were small enough to pass the mesh, a southern barber suspended a piece of sticky fly paper from the ceiling just behind each droplight. This he found an effective means of catching the small "bugs." Three lengths of cord were used to hold the paper, one being attached at the bottom to prevent the paper from being blown against the lamp.—L. H. Unglesby, Baton Rouge, La.



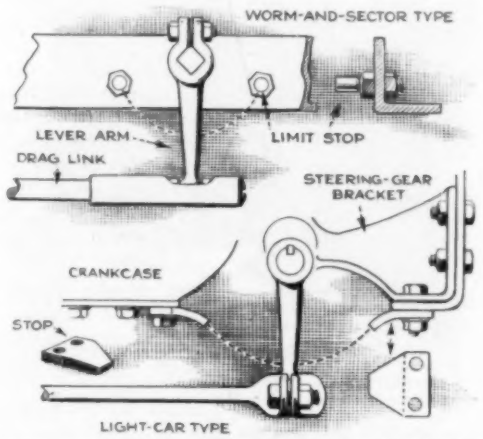
"Killing" Knots

A coating of shellac applied to knots is a well-known measure which is employed universally for preventing knots from showing through painted surfaces. But some knots are so resinous that this common method is not effective, even if several coats of shellac are applied. In such cases it will be found that a small quantity of red lead mixed with the shellac will "kill" the knot and effectively prevent its appearance through the paint.

Avoiding Locking of Steering Gear

In many automobile accidents the cause has been traced to the locking of the steering gear, which may sometimes occur when turning sharp corners and is largely due to wear in the lever arm, drag link and other connecting parts. The danger of having the lever arm lock may be eliminated by either of the two attachments shown in the illustration.

For a worm-and-sector type of steering gear it is usually possible to provide two studs to project from the frame of the car, as shown, to serve as limit stops. In the case of light cars that have the straight-arm type of steering gear, which has the lever arm keyed directly to the steering-post rod, stops are made of 3/16-in. steel plate. They are cut in a triangular shape

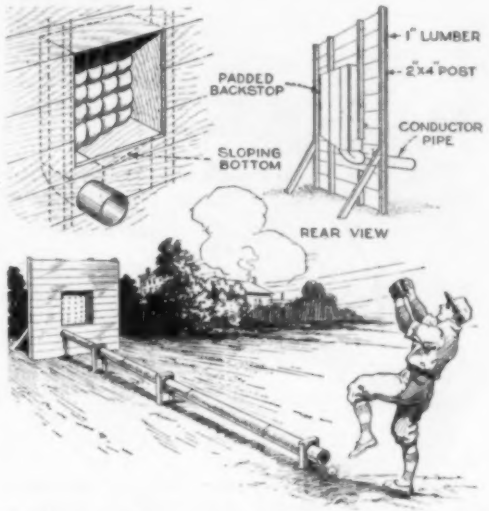


Stops Prevent Steering Gear from Locking by Limiting Its Swing

and are bolted to the underside of the crankcase and the steering-gear bracket, as shown in the lower detail, the ends being bent down a trifle as indicated. It is advisable to bolt up the brackets and measure the throw of the lever before cutting off the ends.

Ball Retriever for Lone Pitcher

The aspiring baseball pitcher is handicapped considerably if forced to practice alone. Bouncing the ball back from the



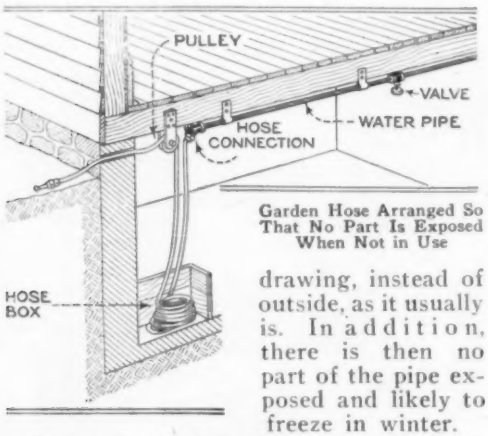
Device for Returning Baseballs to Lone Pitcher and Thus Aiding Him Considerably

side of a building is not satisfactory, and unless an area to show the range of all balls thrown is marked, little is done toward improvement.

The device shown in the drawing was made by a young chap who had no brothers, and no chums near at hand, and was compelled to devise some sort of retrieving apparatus, or walk after the balls after having thrown them. The device consists of a vertical "wall" supported on two posts, with a rectangular opening cut in it. Behind this and slightly larger than the opening is a panel, heavily padded. The panel and wall are joined just below the opening to form a trough, which slopes toward one side. Here a conductor pipe is attached, which runs through the wall and terminates about 30 ft. in front of it at the place where the pitcher stands. Balls thrown through the opening roll through the conductor pipe back to the pitcher. By using two balls he can keep himself busy continually. If the ball fails to enter the opening it will bounce back. But frequent impact against the wood shortens the life of the ball, and if one desires to avoid this, the whole surface of the larger panel may be padded and another collecting trough extended about 1 ft. in front of it, so that all balls will be returned to the point where the pitcher stands.—Dale R. Van Horn, Walton, Neb.

Easy Method of Storing Hose

Much unnecessary wear on the garden hose is avoided by having the hose connection in the basement, as indicated in the drawing, instead of outside, as it usually is. In addition, there is then no part of the pipe exposed and likely to freeze in winter.

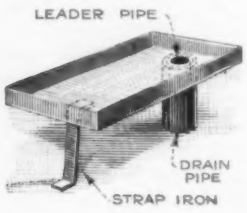


Garden Hose Arranged So That No Part Is Exposed When Not in Use

The hose is left coupled to the faucet in the basement, and kept coiled in a box close to the wall. From the box the hose runs over a pulley fastened to a floor joist above, and passes outside through a pipe set in a hole cut through the wall. The upper edge of the pulley, of course, is in line with the pipe, and the edges of the latter are rounded off, and the inside made smooth with a file and emery, so that the hose will not be damaged in passing through it. A guard, made of heavy tin, may be clamped on the end of the hose just behind the nozzle, if it is desired to prevent it from slipping into the basement.

A Practical Drip Pan

Usually the position of an icebox has to be exact as its drain pipe must be located right above the drain in the floor. However, its position need not be so accurate if a drip pan of the kind shown in the illustration is used. It is simply a tray with a leader pipe soldered at one end and a strap-iron leg at the other; the pan is made preferably of copper or galvanized iron so that it will not rust. It catches the water from the icebox drain pipe and allows it to run through the leader pipe into the floor drain. To insure complete drainage, it would be well to slope the bottom of the pan from all sides toward the leader pipe, which can be done by careful hammering before the latter is soldered in. As an easier alternative, the part of the bottom surrounding the leader pipe opening might be slightly recessed to form a funnellike cup, and in either case the leg should be slightly higher than the floor-drain pipe, to give the pan a backward slant.—L. H. Georger, Buffalo, N. Y.

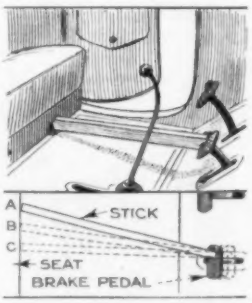


Loosening Corroded Battery Terminals

Corroded battery terminals are often difficult to loosen. A little heat applied with a blowtorch or alcohol lamp will do the work, but if neither of these is handy, one of the little wafers that are used for quick vulcanizing can be used. It is placed on the terminal and lighted. As it burns away it will heat up the terminal sufficiently to loosen it. Care must be taken, of course, not to melt the terminal.—Chas. Olsen, Fond du Lac, Wis.

Adjusting Auto Brakes

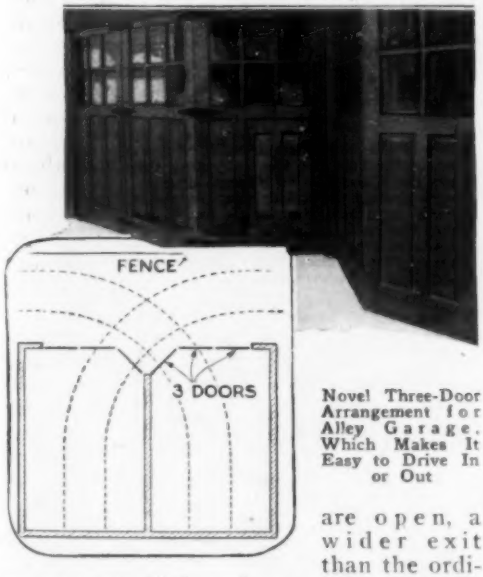
Of the parts on an automobile those that wear most rapidly and need most frequent adjustment are the brakes. Keeping these in good condition is essential to safety, especially in congested cities where sudden stops are often necessary to avoid collisions. Brakes are usually adjusted by two persons, one seated in the car pushing the brake pedal down and the other making the adjustments and testing the brake by turning the rear wheels, which are jacked up. This method, however, is very inaccurate, as the exact tension of both brakes cannot be equalized in this way, because the pressure applied to the brake by the person inside of the car is not uniform, but varies slightly from one moment to the next. A much better method is shown in the illustration. A length of ¾-in. wood, about 2 in. wide, a trifle longer than the distance from the edge of the seat to the brake-pedal shank when the brake pedal is pushed down as far as possible, and having a notch at one end to fit the brake pedal, is used to hold the brake down. In making the adjustment, the stick is put in position A so that there is a slight pressure on the pedal.



With the rear wheels jacked up, each one of them is turned around by hand. If both wheels turn with the same effort, no adjustment need be made so far. But if one wheel turns much more easily than the other, the brake on that wheel must be tightened until it turns just as hard. The stick on the pedal is then shifted to position B, where it will exert more pressure on the brakes. The wheels are again turned to see if the brakes are equally set. A careful adjustment of either brake may still be necessary. After this is done, the stick is moved to position C, where it presses the pedal down almost entirely. Both wheels should now be absolutely immovable, and if this is the case, they are in perfect condition. The stick should be long enough so that it will not be quite at right angles to the seat even in the last position.—J. E. Dekker, Chicago, Ill.

Convenient Garage Doorway

When driving an automobile into or out of a garage on the alley, it is difficult to make the short turn required by the limited width of the alley, especially with large cars. In building two adjoining garages this trouble was taken into consideration and eliminated by the three-door arrangement shown in the photo. The center wall is shorter than the outer walls so that the doors next to it close at an angle to the others. In this way, when all three doors

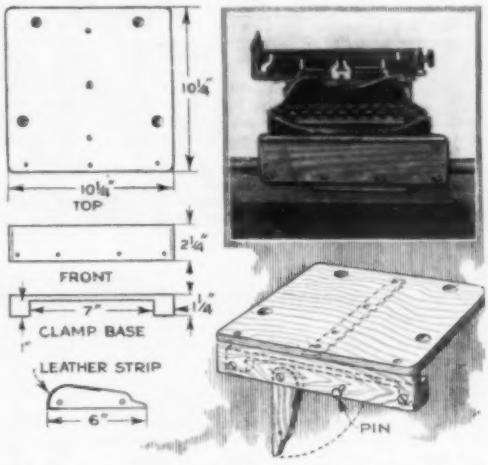


Novel Three-Door Arrangement for Alley Garage, Which Makes It Easy to Drive In or Out

are open, a wider exit than the ordinary is provided, and one can drive in or out in a larger arc, as indicated by the dotted lines in the insert.

Rigid Holder for Portable Typewriter

Many people prefer a small portable typewriter to a large one for home use, but find that the movement of the carriage, which is large and heavy in proportion to



Wooden Holder for Light Portable Typewriter Is Clamped to Table Top

the rest of the machine, causes the machine to travel toward the left continually, making it necessary to move it back to its original position frequently. This trouble is readily overcome by means of a holder of the kind shown in the photograph. It consists of a board of ¾-in. material, having holes, counterbored in the top, to receive the legs of the typewriter; a front piece of the same material, screwed to the top piece as indicated, and a clamp by which the holder is fastened securely to the table. The details of construction are given in the drawing. The size of the clamp depends on the thickness of the table top, and if different tables are to be used, the clamp should be suited to the thicker one, small wooden wedges being used to clamp the holder to the thinner. A hardwood piece, about ½ in. wide and ⅛ in. thick, as a brace for the thin wood, is mortised into the underside of the holder and held with glue and three screws. The appearance of the holder may be improved by the application of a coat of black paint. —Harold R. Harvey, Buhl, Idaho.

It often happens after stuffing and sewing up a fowl for roasting, that some of the dressing comes out between the stitches, making it rather difficult and disagreeable to handle. This trouble can be prevented by putting the end crust of a loaf of bread inside of the opening.

From the Bureau's Mail Bag

In your July, 1920, issue, I saw an illustration of an improved steam tractor. Please furnish name and address of maker. The oil or internal-combustion engine is beginning to do good work here, but old steam-engine users would like to retain them where practicable, but our old English engines are too heavy.

We are constant readers of the Popular Mechanics Magazine and the children take a great deal of interest in it and get a great deal of information from it. During the war, it was very expensive, and we stopped having it for a while. Farming here is mostly successfully done by farmers who have their own help, but the man who employs labor unless in a large way, does not seem to make much headway, unless he has more side lines.

If the tractor does what it mentions it will be just the thing for many districts around here, as it burns a low-grade oil, and there is a refinery in Melbourne where this oil can be obtained.—Thomas J. Nicholas, Barnedown, Victoria, Australia.

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Kindly excuse me for the trouble I put you to with my present. I am a refugee from Russia, where after twenty-five years of hard work, I was ruined and robbed by the Bolsheviks to the last handkerchief. I hardly escaped to Constantinople last summer, where I started a commission business. I had the honor to write you last August for some catalogs and particulars. Unfortunately, I could not wait for your kind reply, because on account of the unexpected and sudden catastrophe in Asia Minor, I had to run away immediately from Constantinople and come here.

In what condition are the refugees of the Turkish atrocities know well your Near East Relief here, as well as the American Red Cross Society, who generously have spent millions of dollars to help these poor and miserable creatures. Taking courage of such an example of the noblest citizens of such a philanthropic country and having not the address of friends in America, I take the liberty to address myself to you, asking for a moral assistance.

After Russia, Greece is a microscopic country. No business can be done here unless you have a big capital. It is a real struggle for life and the only modus vivendi is to deal with small and cheap articles, especially novelties, that can be easily sold. I have still a little capital, and I desire to deal for the present in small objects. Excuse me again for the trouble. Your kind care and advice will save me and I shall be to you forever grateful. Thanking you in anticipation.—A. Athanasides, Athens, Greece.

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I would be very grateful if you would inform me as to where I could send to get all available information about the selenium cell which has from time to time been mentioned in your valuable magazine. I wish to conduct experiments in telling the color of dried fruits and as we cannot get the necessary equipment in Australia, I have taken this liberty of asking if you could help me out of this difficulty. Your magazine is well read in these parts and I myself have read it for some years past and always derived a great deal of pleasure and knowledge from so doing.—J. J. Dix, The Palms, Renmark, South Australia.

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I have to thank you for your letter of the 19th December last, and for your help in regard to my questions. I believe you have put me on to one agency, at least, that promises very well—and I appreciate it.—Fred T. Tate, Dunedin, New Zealand.

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Can I beg you to have some lists of small tools and machinery for metal and woodworking sent me? I am an amateur, tools are exceedingly hard to get here, in fact they are unobtainable. Your magazine is the best of the kind that I know, and in places like this where one is 3,000 miles from tools is a great help.—John K. Cridland, Retirement Riverside, Hanover, Jamaica, British West Indies.

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As I can very often read that you will answer any question concerning to mechanics, I just want you to give me the address of a house that make something we call in Spanish "Iman" and in Inglish must be something like magneto. I am not sure but I can explain you that what I mean is a pease of steel which its chape is the same of the horseshoe but is more narrow and it atrats the iron by putting it near the magnet. So by this plain explanation I believe you must know what I mean, so if you know of any house who make them please teel it to me sending the adres to the following direction.—Alberto Veloso Serrano, Santiago de Cuba.

* * *

I have been a reader of your magazine for some considerable time and have derived very great benefits from it in my occupation as an engineer, especially in your Shop Notes, some of which I find almost indispensable. Your Bureau of Information is a great boon to readers, so, availing myself of it, I am writing to ask if you could inform me where I could purchase some parachutes. I have made four descents from an airplane in parachutes that were used in exhibitions from balloons, but as they were not my property, I desire to purchase some for myself. I would be much obliged if you would pass on my address to some concern dealing in parachutes.—O. McGrath, Public Works Engineer, Shannon, New Zealand.

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I am a constant reader of Popular Mechanics and find it very interesting for myself and most valuable in promoting my children's interest in learning the English language.—J. O. Darche, Sherbrooke, Que., Canada.

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As you are aware, no doubt, this is a great sugar producing country, as a matter of fact, sugar is one of Brazil's staple products. Some of the largest sugar mills of the country are situated in the state of Rio, not more than 8 or 12 hours from the Capital, the Federal district. If possible, I would greatly appreciate your furnishing me with more details regarding the article on "Low grade molasses yields fuel and potash." I don't mind telling you that if there is a possibility of utilizing the process to advantage in this country, it is my intention to do so.—G. Dale, Rio de Janeiro, Brazil.

* * *

Please let me have the addresses of the makers or sellers of all the things I have mentioned which you have in your magazine. You may think that I ask too much, but they are not all mine, some are of my friends, but as they do not speak or write English, they asked me to do it for them, because when I translate them they ask me to ask you about all these things. Giving you my very best thanks.—Salvador Giron Collier, Guatemala City, C. A.

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I very much appreciate the information you gave me in reply to my inquiry in regard to stones coming up through the earth. This bit of information will be very much relished by the members of Hollansburg Grange 2196, as there was quite an argument on the subject. I also obtained some information from you concerning a "divining rod" that was used to locate oil, and the information you gave us caused us to feel rather pessimistic before the well was begun. We very likely saved a neat sum of money by taking your advice and investing lightly, for the well turned out dry.—Ernest J. Downing, New Madison, Ohio.

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